National Park Service
U.S. Department of the Interior

Minute Man National Historical Park, Massachusetts

Acoustic Resource Management Plan and Environmental Assessment

October 2014

SUMMARY

Minute Man National Historical Park (NHP) is located in Concord, Lexington, and Lincoln, MA. Containing 1,038 acres, the park preserves historic sites, structures, properties and landscapes associated with the opening battles of the American Revolution, which occurred April 19th, 1775. Public Law 86-321, passed by Congress in 1959, established Minute Man NHP to preserve and interpret properties related to the Battles of Lexington and Concord. This act was supplemented by Public Law 102-488 in 1992, which expanded the park boundary and reiterated the purpose of the park to include the preservation and interpretation of the American Literary Renaissance sites and the historic landscape along the Battle Road between Lexington and Concord. The park was expanded again in 2012 with the addition of the Colonel Barrett House and Farm to the west. The sounds associated with these important sights are vital to providing visitors with an environment that is conducive to reflection and contemplation of the events that occurred at the park.

In order to protect this acoustic environment and soundscape, the National Park Service prepared this Acoustic Resource Management Plan for Minute Man NHP. The purpose of this Acoustic Resource Management Plan (ARMP) and Environmental Assessment (EA) is 1) to link acoustic resource management to existing park management direction, (2) to define the existing ambient acoustic conditions, 3) to provide objectives and standards for current and future management, and 4) to identify potential management actions designed to ensure that acoustic objectives and standards are met.

The EA evaluates two alternatives: Alternative A - No Action and Alternative B - Preferred Alternative. Alternative A represents no change from current management direction or level of management intensity and involves continuing with the present course of action expressed in existing park management documents. Alternative B includes the development of a management plan that describes appropriate and inappropriate sound sources and levels, acoustic environment objectives, acoustic indicators and standards, monitoring approaches and protocols, and methods for modifying the plan using an adaptive management approach.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet objectives of the proposal, 2) evaluates potential issues and impacts to Minute Man NHP resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. Resource topics evaluated in detail in this document are a) acoustic environment and soundscapes, b) visitor use and experience, c) park operations, d) wildlife and threatened and endangered animal species and animal species of concern, e) cultural landscapes, and f) historic structures. All other resource topics were dismissed because the project would result in negligible to less than minor effects. No major adverse effects were identified as a result of this project. No adverse effects on cultural resources under Section 106 of the National Historic Preservation Act (NHPA) would occur. Public scoping was conducted to assist with the development of this document; comments were received and considered in the evaluation of effects.

Public Comment

If you wish to comment on this ARMP and EA, access the document and comment form at http://planning.nps.gov. Alternatively, send comments to: Lou Sideris, Chief of Planning and Communication, Minute Man NHP, 174 Liberty Street, Concord MA 01742 or lou_sideris@nps.gov.

This ARMP and EA will be on public review for 30 days. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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PURPOSE AND NEED

INTRODUCTION

Minute Man National Historical Park (NHP) is located in Concord, Lexington, and Lincoln, MA. Containing 1,038 acres, the park preserves historic sites, structures, properties and landscapes associated with the opening battles of the American Revolution, which occurred April 19th, 1775. Public Law 86-321, passed by Congress in 1959, established Minute Man NHP to preserve and interpret properties related to the Battles of Lexington and Concord. This act was supplemented by Public Law 102-488 in 1992, which expanded the park boundary and reiterated the purpose of the park to include the preservation and interpretation of the American Literary Renaissance sites and the historic landscape along the Battle Road between Lexington and Concord. The park was expanded again in 2012 with the addition of the Colonel Barrett House and Farm to the west. The sounds associated with these important sights are vital to providing visitors with an environment that is conducive to reflection and contemplation of the events that occurred at the park.

In order to protect the park's acoustic environment, the National Park Service prepared an Acoustic Resource Management Plan for Minute Man NHP. The purpose of this Acoustic Resource Management Plan (ARMP) and Environmental Assessment (EA) is (1) to link soundscape and acoustic management to existing park management direction, (2) to define the existing ambient acoustic environment, (3) to provide objectives and standards for its current and future management, and (4) to identify potential management actions designed to ensure that acoustic resource objectives and standards are met.

This document was formulated and prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ) (40 CFR §1508.9), and the National Park Service (NPS) Director's Order (DO)-12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*. This plan is tiered from the Minute Man National Historical Park General Management Plan (GMP) (NPS, 1989), and Foundation Document (NPS, 2014).

BACKGROUND

Minute Man NHP was authorized in 1959 by P.L. 86-321 "to preserve for the benefit of the American people certain historic structures and properties of outstanding national significance associated with the opening of The War of the American Revolution." The authorizing legislation was amended in 1992 after completion of the last GMP by P.L. 102-488 which reaffirmed the congressional intent and specifically directed the park to preserve and interpret "the historic landscape along the road between Lexington and Concord." The 1992 legislation also included, among other items, a statement to the park's purposes calling for the "preservation and interpretation of … sites associated with the causes and consequences of the American Revolution." This statement has been interpreted as allowing the park to look beyond the events of April 19, 1775 and to see the park in a context broader than the Revolutionary War itself. P.L. 102-488 also established park purpose of preserving and interpreting the American Literary Renaissance at sites in the Wayside Unit.

Minute Man NHP is located approximately 16 miles northwest of Boston, MA. The region surrounding the park has developed from a semi-rural area to mature suburbs and experiences continual growth

pressures. Growth from residential, commercial, and industrial development has increased impacts from traffic, noise, and density in and around the park. The park attracts more than one million visitors each year.

Minute Man NHP has four units including Battle Road Unit, North Bridge Unit, Wayside Unit, and Barrett's Farm Unit. Figure 1. Park Mapshows the park boundaries and individual units.

Battle Road Unit - The Battle Road Unit, with 849 acres, encompasses the road that passes from Meriam's Corner in Concord through Lincoln to Fiske Hill in Lexington, along which local militias battled British regulars. Stretching about four miles along Massachusetts Avenue / North Great Road / Lexington Road / Route 2A, the Battle Road Unit has been rehabilitated in many places to reveal the landscape of 1775. The unit features the Minute Man Visitor Center and many historic buildings and sites, including Parker's Revenge, Fiske Hill, Captain William Smith House, Paul Revere Capture Site, Hartwell Tavern, Bloody Angle, and Meriam's Corner. Much of the Battle Road Trail has been returned to the width and material of the historic Battle Road. The trail traverses woodlands, wetlands, and agricultural farm fields.

North Bridge Unit - Located in Concord, the core of this unit is the North Bridge, which crosses the Concord River. The rebuilt structure commemorates the fighting between local militia and minute companies and British regulars on April 19, 1775. This unit also includes the North Bridge Visitor Center, Minute Man Statue, and Major John Buttrick House.

Wayside Unit - The Wayside, a National Historic Landmark dating from before the American Revolution, is located in Concord. In the 19th century, it became the home, sequentially, of educator Bronson Alcott, writers Louisa May Alcott and Nathaniel Hawthorne, and children's author Margaret Sidney. This unit celebrates Concord's rich literary tradition and the development of a uniquely American literature.

Barrett's Farm Unit - Barrett's Farm was the home of Colonel James Barrett, who commanded the Middlesex Militia in 1775 and was responsible for stockpiles of arms and supplies for the colonial militia. Colonel Barrett used his farm as a storage depot. British troops were seeking these arms on April 19, 1775, precipitating the Battles of Lexington and Concord and the Revolutionary War.

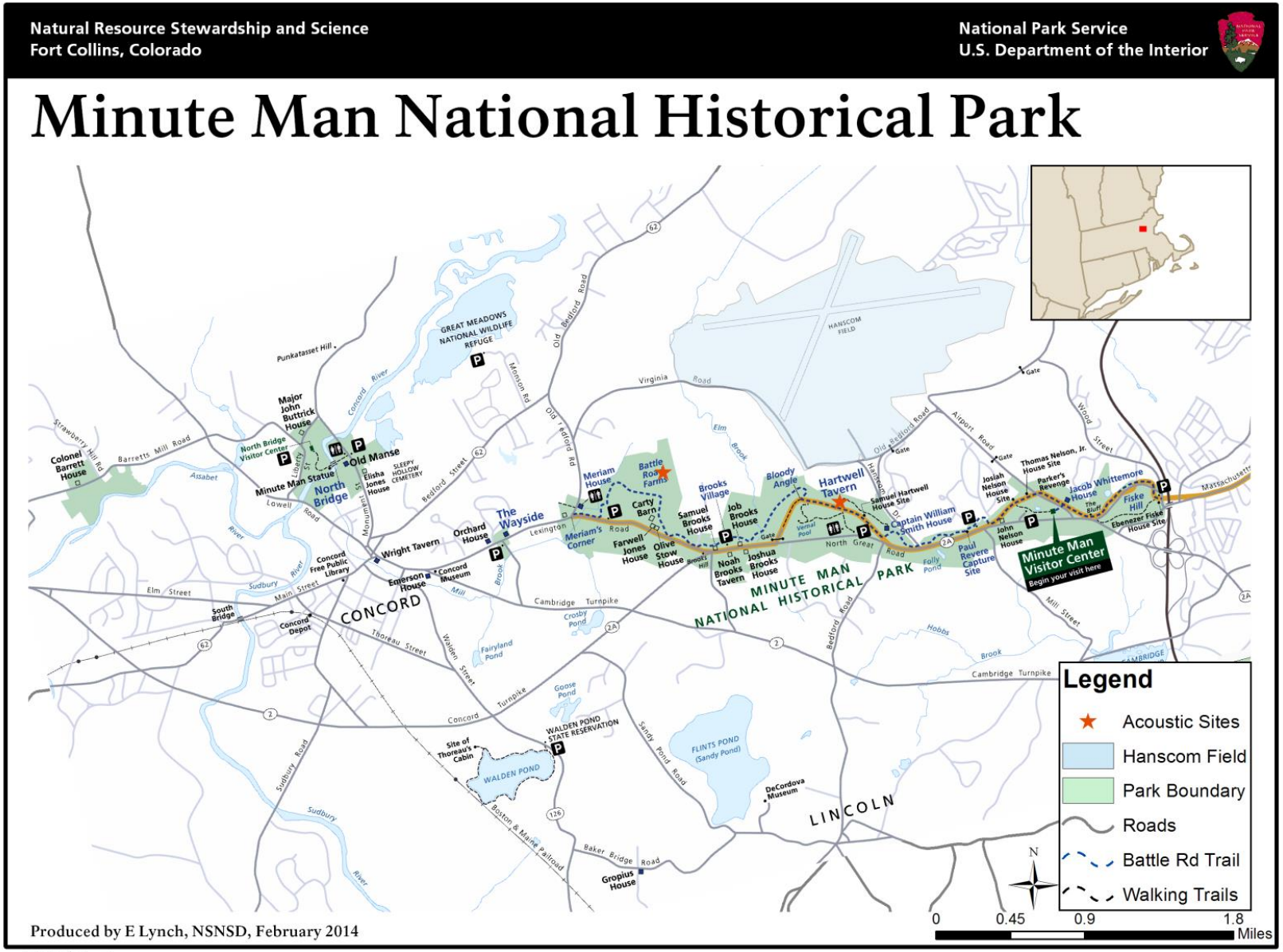

Figure 1. Park Map

Acoustic Environment/ Soundscape

The park acoustic environment offers an array of rich and diverse natural and culturally appropriate sounds. These sounds are an integral component of what makes Minute Man NHP a unique place set aside for purposes expressed in the NPS Organic Act and the park's enabling legislation. An important part of the NPS mission is to preserve or restore the natural and culturally appropriate sounds and acoustic resources of parks and provide for enjoyable visitor experiences.

For management and planning purposes, it is important to distinguish and define certain key terms. *Acoustic resources* are physical sound sources, including both natural sounds (wind, water, geophysical, wildlife, vegetation) and cultural and historic sounds (battle reenactments, tribal ceremonies, quiet reverence). The *acoustic environment* is the combination of all the acoustic resources within a given area - natural sounds as well as human-caused sounds - together with the physical capacity for transmitting sounds in a given environment. *Soundscape* is the component of the acoustic environment that can be perceived and comprehended by the humans. The character and quality of the soundscape influence human perceptions of an area, providing a sense of place that differentiates it from other regions. *Noise* refers to sound which is unwanted, either because of its effects on humans and wildlife, or its interference with the perception or detection of other sounds.

The natural acoustic environment exists in the absence of human-caused sound. Natural sounds occur within and beyond the range of sounds that humans can perceive, and can be transmitted through air, water, or solid materials. Some natural sounds in the natural acoustic environment are also part of the biological or physical resource components of the park, such that protection of the soundscape also constitutes protection of other resource values directly identified as necessary to the park's purpose.

Cultural soundscapes include opportunities for appropriate transmission of cultural and historic sounds that are fundamental components of the purposes and values for which the parks were established. Culturally appropriate sounds are important elements of the national park experience in many parks. Examples of appropriate cultural and historic sounds can include drumming, battle reenactments, traditional music, farm animals, and Native American chants and songs. At military sites and battlefields such as Minute Man NHP cultural sounds often include bands, muskets, cannon fire, or other military demonstrations. NPS works to prevent inappropriate or excessive types and levels of noise from unacceptably impacting the ability of the acoustic environment to transmit the cultural and historic resource sounds associated with park purposes.

Natural and cultural sounds are inherent components of "the scenery and the natural and historic objects and the wild life" protected by the NPS Organic Act. They are vital to the visitor experience of many parks and provide valuable indicators of the health of various ecosystems. Cultural sounds can provide visitors with a richer and more complete understanding of day-to-day life and experience during important places and periods in our nation's history. Noise is of concern because it can degrade the acoustic environment, impede ecological function and diminish a visitor's ability to experience the sounds associated with park purposes. As was reported to the U.S. Congress in the *Report on the Effects of Aircraft Overflights on the National Park System* (NPS, 1995), a system-wide survey of park visitors revealed that nearly as many visitors come to national parks to enjoy the natural sounds (91 percent) as come to view the scenery (93 percent). Noise can distract visitors from the resources and purposes of cultural areas--the tranquility of historic settings and the solemnity of memorials, battlefields, prehistoric ruins, and sacred sites.

Increasingly, parks do not sound like they once did. Natural and cultural sounds are being masked or obscured by a wide variety of human activities. In some parks, the ability to hear sounds is disappearing at such a rate that some sounds sources may be gone before their existence can even be documented. Thus, soundscape preservation and noise management is one dimension of the complex challenge of

achieving the NPS mission of preserving park resources unimpaired for the enjoyment of present and future generations.

NPS guidance requires park superintendents to identify sounds that are intrinsic to the park purpose and to determine levels of human-caused sound which can be accepted given the management purposes of park. Within and adjacent to parks, park managers are required to monitor noise that adversely affects park acoustic environment and soundscapes. Further, the NPS should take action to prevent or minimize all noise that adversely affects park acoustic environment, soundscapes and other resources and values, or that exceeds levels acceptable for visitor use and enjoyment.

PURPOSE

The purpose of the action is to protect and manage the acoustic environment and soundscape in Minute Man NHP and to:

- Protect the acoustic experience of park visitors and ensure that cultural and natural sounds continue to play an important role in the enjoyment of park resources and values.
- Protect acoustic conditions for wildlife and the role of the acoustic environment in ensuring healthy and dynamic ecosystems.
- Provide an approach to protect and manage the acoustic environment that is consistent with National Park Service policy.

Specifically the purpose is to:

- Identify appropriate and inappropriate acoustic sources for the Historic/Commemorative Zone and the Development Zone.
- Identify and implement indicators of acoustic environment quality.
- Develop acoustic standards for the Historic/Commemorative Zone and the Development Zone.
- Identify and implement methods for monitoring acoustic resource conditions to ensure that quality standards are being met.
- Identify management actions to be taken to ensure that acoustic resource quality standards are not exceeded and to restore a degraded acoustic environment to desired conditions.
- Identify a process to eliminate or mitigate sources of sound that are not appropriate to park purposes or management objectives.

NEED

In surveys of the American public, 91 percent of respondents indicated that providing opportunities to experience natural quiet and the sounds of nature was an important reason for having national parks (NPS, 1995). In fact, 72 percent felt that one of the most important reasons for preserving national parks is to provide opportunities to experience natural peace and the sounds of nature (Haas & Wakefield, 1998). In response to the value the public places on soundscapes, NPS requires park managers at historic sites to preserve and safeguard the natural and cultural soundscape so that the sounds related to the place and time associated with the purpose of the park can be experienced by visitors.

The action is needed because:

- Appropriate sounds and sound levels are essential to ensuring an authentic experience of cultural and historic events, landscapes, resources, and values. Culturally significant sites and resources at Minute Man NHP can be diminished by unwanted or inappropriate sounds.
- Minute Man NHP's 1.2 million annual visitors come to directly experience and gain understanding of the place where the opening battles of the American Revolution led to the creation of our nation. Visitors seek a sense of place, historical understanding, and quiet contemplation in the actual place where these events occurred. As a result, Minute Man NHP

has identified a "Contemplative Visitor Experience" as a fundamental park value in general planning documents.

- Traffic noise from Route 2A, aircraft overflights from Hanscom Field, park operations and other noise sources can be detrimental to visitor experience. Visitors report that noise and speed of cars on Route 2A are the greatest impacts on their experience at the park (Le et al., 2008).
- Visitors to Minute Man NHP appreciate and value natural and cultural sounds and an acoustic resource management program will help ensure that the soundscape resource is preserved in an unimpaired condition for future generations.
- Acoustic resource management activities require collaboration with federal, state, county, and local entities, and a soundscape management plan provides a basis for communication, coordination, and project planning with partners and neighbors.
- Sounds play an important role in maintaining healthy and diverse ecosystems. A properly functioning acoustic environment is important for animal communication, territory establishment, predator and prey relationships, mating behaviors, nurturing young, effective use of habitat, and other natural functions. An acoustic resource management program is needed to promote ecosystem sustainability.

Like many areas in the U.S., including other national parks, the sources and intensity of noise in Minute Man NHP have increased in recent decades. Today, commercial airlines, general aviation, and other aircraft routinely fly over the park. Tour buses, trucks, cars, and motorcycles as well as park operations and other activities also add to noise levels in many areas of the park. This ARMP provides a systematic approach to addressing noise issues, now and in the future.

RELATIONSHIP WITH OTHER PLANS

Planning in the NPS takes two different forms: general management planning and implementation planning. General management plans are required for national parks by the National Park and Recreation Act of 1978. Implementation plans, which tier off of general management plans, focus on "how to implement an activity or project needed to achieve a long-term goal" (NPS, 2006). Minute Man NHP's *General Management Plan* (NPS, 1989) and the Foundation Document (NPS, 2014) are the foundational documents for managing the park.

The Minute Man GMP and Foundation Document provide general guidance on the management of natural and cultural soundscapes. Descriptions, strategies for management, and actions reflected in the General Management Plan (GMP) are provided below in the description of the no action alternative. The programmatic guidelines, findings, objectives, standards and mitigation measures expressed in this ARMP provide additional detail to the GMP and Foundation Document direction for acoustic and noise management, and are consistent with GMP decisions. The Foundation Document establishes a Contemplative Visitor Experience as a fundamental value and Natural Resources as an important resource. It further states that park managers will manage park acoustic resources to foster a more contemplative environment appropriate to a commemorative and historical setting. It is the purpose of this plan, tiering from the park's GMP and Foundation Document, to meet these needs by providing specific management actions to be implemented and specific procedures to be followed. Nothing in this plan should conflict with other resource plans for the park.

APPROPRIATE USE

The goals, objectives, and management actions outlined in this plan are consistent with NPS policy as described in NPS *Management Policies 2006*, sections 1.5, 8.1.2, and 8.2.

Section 1.5 of *Management Policies 2006*, *Appropriate Use of Parks*, directs that the NPS must ensure that uses allowed in parks would not cause impairment of, or unacceptable impacts on park resources and values. A new form of park use may be allowed within the park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts.

Section 8.1.2 of *Management Policies 2006*, *Process for Determining Appropriate Uses*, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

- consistency with applicable laws, executive orders, regulations, and policies;
- consistency with existing plans for public use and resource management;
- actual and potential effects on park resources and values;
- total cost to the Service; and
- whether the public interest will be served.

Park managers must continually monitor park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use, or discontinue it.

Section 8.2 of *Management Policies 2006*, *Visitor Use* states: "To provide for enjoyment of the parks, the National Park Service will encourage visitor use activities that:

- are appropriate to the purpose for which the park was established, and
- are inspirational, educational, or healthful, and otherwise appropriate to the park environment; and
- will foster an understanding of and appreciation for park resources and values, or will promote enjoyment through direct association with, interaction with, or relation to park resources; and
- can be sustained without causing unacceptable impacts to park resources and values."

SCOPING

Scoping is an effort to involve agencies, organizations, governments, and the public to:

- determine which issues should be addressed in the ARMP and EA;
- determine important issues to be given detailed analysis and eliminate issues not requiring detailed analysis;
- identify related projects and associated documents;
- identify permits, surveys, consultations, etc., required by other agencies; and
- create a schedule that allows adequate time to prepare and distribute the ARMP and EA for public review and comment before a final decision is made.

Early in the planning process, staff at Minute Man NHP conducted internal scoping. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, determined the likely issues and impact topics, and identified the relationship of the proposed action to other planning efforts at Minute Man NHP.

Input for this ARMP was integrated with public scoping for the General Management Plan Amendment for the Battle Road Unit (still in draft) and Foundation Document. A public workshop was held in February 2007 with over 100 participants. Newsletters and invitations were sent to a large distribution list. Meeting announcements and results were posted on the park website (www.nps.gov/MIMA) and the NPS Planning, Environment and Public Comment (PEPC) website (planning.nps.gov). A major visitor use survey was conducted at the park in 2007 (Le, et al., 2008). The results were presented and discussed

at a well-attended meeting in June 2008 with participants from the park, the Concord and Lexington Chambers of Commerce, managers of nearby historic sites, Friends of Minute Man National Park, and other public entities. Letters were sent to the Massachusetts State Historic Preservation Officer, U.S. Fish and Wildlife Service, and the Wampanoag Tribe of Gay Head (Aquinnah) Tribal Historic Preservation Officer notifying them of the start of the planning process, and inviting them to participate.

ISSUES AND IMPACT TOPICS RETAINED FOR FURTHER ANALYSIS

In the *Affected Environment and Environmental Consequences* section of this document NPS considers the direct, indirect, and cumulative effects of the proposed action on the environment, along with connected and cumulative actions. Impacts are described in terms of context and duration. The context or extent of the impact is described as localized or widespread. The duration of impacts is described as short-term or long-term. The intensity and type of impact is described as negligible, minor, moderate, or major, and as beneficial or adverse. The NPS equates "major" effects as "significant" effects. The identification of "major" effects would trigger the need for an Environmental Impact Statement (EIS). Where the intensity of an impact could be described quantitatively, the numerical data are presented; however, most impact analyses are qualitative and use best professional judgment in addition to available data to make the assessment.

The NPS defines "measurable" impacts as moderate or greater effects. It equates "no measurable effects" as minor or less effects. "No measurable effect" is used by the NPS in determining if a categorical exclusion applies or if impact topics may be dismissed from further evaluation in an EA or EIS. The use of "no measurable effects" in this EA pertains to whether the NPS dismisses an impact topic from further detailed evaluation in the EA. The reason the NPS uses "no measurable effects" to determine whether impact topics are dismissed from further evaluation is to concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail in accordance with CEQ regulations at 1500.1(b).

Impact topics for the proposed action have been identified on the basis of federal laws, regulations, and orders; *Management Policies 2006*; and NPS knowledge of resources at Minute Man NHP. Impact topics that are carried forward for further analysis in this EA are listed below. Each impact topic is further described and analyzed in the *Affected Environment* and *Environmental Consequences* sections of this document.

Acoustic Environment and Soundscape

In accordance with the *Management Policies 2006*and DO-47: *Soundscape Preservation and Noise Management*, an important component of the NPS mission is the preservation of cultural and natural sound resources associated with national park units. Natural soundscapes and natural acoustic conditions exist in the absence of human-caused sound. Although the management policies currently refer to the term *soundscape* as the aggregate of all natural sounds that occur in a park, differences exist between the physical acoustic sources and human perceptions of those sound sources. Because the NPS works to protect and enhance park resources and visitor experiences, it is important to distinguish and define certain key terms. *Acoustic resources* are physical sound sources, including both natural sounds (wind, water, geophysical, wildlife, vegetation) and cultural and historic sounds (battle reenactments, tribal ceremonies, quiet reverence). The *acoustic environment* is the combination of all the acoustic resources within a given area - natural sounds as well as human-caused sounds - together with the physical capacity for transmitting sounds in a given environment. *Soundscape* is the component of the acoustic environment that can be perceived and comprehended by the humans. The character and quality of the soundscape influence human perceptions of an area, providing a sense of place that differentiates it from other regions. *Noise* refers to sound which is unwanted, either because of its effects on humans and wildlife, or its interference with the perception or detection of other sounds.

Culturally appropriate sound sources and the capacity to transmit cultural sounds are also important components of the acoustic environment. Opportunities to hear cultural sounds such as battle reenactments, living history demonstrations, agricultural sounds, and musket fire are important elements of the park experience at Minute Man NHP. NPS strives to protect opportunities for appropriate transmission of cultural and historic sounds that are fundamental components of the purposes and values for which the parks were established. NPS works to prevent inappropriate or excessive types and levels of noise from unacceptably impacting the ability of the acoustic environment to transmit the cultural and historic resource sounds associated with park purposes.

The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among NPS units and can vary throughout each unit, being generally greater in developed areas and less in undeveloped areas. Because the proposed actions in this plan have the potential for measurable effects on the acoustic environment, this topic has been carried forward for further analysis in this document.

Visitor Use and Experience

According to the *Management Policies 2006*, the enjoyment of park resources and values by people is part of the fundamental purpose of all park units. The NPS is committed to providing appropriate, high quality opportunities for visitors to enjoy the parks, and will maintain within parks an atmosphere that is open and inviting for all segments of society. Further, the NPS will provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the exceptional natural and cultural resources found in parks.

Over 1.2 million people visited Minute Man NHP in 2011. The most common visitor activities include sightseeing, hiking, walking, and attending interpretive programs and special events (Le, et al., 2008). As in other national parks, visitors enjoy the sounds of nature: bird songs, the rustling of leaves, the sound of the river, and wind through the trees. These sounds can have a calming or relaxing effect; or they can trigger memories of a pleasant past experience. Cultural sounds such as battle reenactments, musket fire, and the sounds of agriculture can help visitors gain a more complete understanding of the events that occurred at the park in April 1775. Because the proposed actions in this plan have the potential for measurable effects on visitor use and experience, this topic has been carried forward for analysis in this document.

Park Operations

Park operations refer to the protection and maintenance of infrastructure by park staff to protect and preserve vital natural and cultural resources and provide for a quality visitor experience. Infrastructure includes: roads, trails, housing for staff, visitor facilities (visitor centers, restrooms, picnic areas), administrative buildings, management-support facilities (garages, shops, storage buildings, areas used to house and store maintenance equipment, tools and materials), and utilities (phones, sewer, water and electricity). Other park operations include activities performed by law enforcement, search and rescue, resource management, interpretation of park resources, fire management, administrative activities, and cooperative association activities. Many of these actions use motorized equipment that generates sound. Because the proposed actions in this plan have the potential for measurable effects on park operations, this topic has been carried forward for analysis in this document.

Wildlife, Threatened and Endangered Animal Species, Animal Species of Concern

The NPS strives to maintain all components and processes of naturally evolving ecosystems including the natural abundance, diversity, dynamics, distribution, habitats, and behaviors of native animal populations and the communities and ecosystems in which they occur. NPS policy is to protect the natural abundance and diversity of all naturally occurring communities. The NPS *Management Policies 2006*, NPS DO-77:

Natural Resource Management and other NPS policies provide general direction for the protection of wildlife and wildlife habitat.

Many animals decipher sounds to find desirable habitat and mates, avoid predators and protect young, establish territories and to meet other survival needs. Scientific studies have shown that wildlife can be adversely affected by noises that intrude on their habitats. The park represents an important aspect of their feeding, nesting, and breeding patterns. Proposed activities included in this plan could affect wildlife. Therefore, the impact topic of wildlife is addressed.

Cultural Landscapes

As described in DO-28: *Cultural Resource Management*, a cultural landscape is "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values." Several landscapes within the unit relate to the Revolutionary-era. These landscapes directly contribute to the site's designation to the National Register of Historic Places and the inclusion of several sites within the park as National Historic Landmarks. Because the proposed action has the potential to alter these historic landscapes, the impact topic of cultural landscapes is addressed. Implementing plan could affect cultural landscapes so the impact topic is addressed. Activities will minimize noise levels in the park which will have beneficial impacts to the cultural landscape.

Historic Structures

As described in DO-28: *Cultural Resource Management*, a historic structure is defined by the NPS as "a constructed work, usually immovable by nature or design, consciously created to serve some human act." In order for a structure or building to be listed on or eligible for listing on the National Register of Historic Places, it must possess historic integrity of those features necessary to convey its significance, particularly with respect to location, setting, design, feeling, association, workmanship, and materials. The National Register Bulletin #15: How to Apply the National Register Criteria for Evaluation (NPS, 1990) provides a comprehensive discussion of these characteristics. Minute Man NHP contains 43 historic buildings listed on the National Register. Actions in this plan may affect equipment on or around historic structures and could have a potential effect on the feeling, setting, and association of the historic designation. Reduction of noise and actions from noise management would have beneficial effects to the overall feeling, setting and association of the structures by reducing the amount and levels of modern, man-made sounds. Some noise reduction efforts from the plan such as installation of mufflers or noise barriers, installation of modern, quieter machinery (i.e. HVAC) could negatively affect historic structures. All actions will be in accordance with section 106 of the National Historic Preservation Act (NHPA) and will prevent adverse effects to historic structures. Because there will be beneficial affects to setting and association and any potential effects will be mitigated in accordance with NHPA there will be beneficial effects on historic structures.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

In this section of the EA, NPS provides a limited evaluation as to why some impact topics are not evaluated in more detail. Impact topics are dismissed from further evaluation in this EA if:

- they do not exist in the analysis area; or
- they would not be affected by the proposal or alternatives, or the likelihood of impacts are not reasonably expected; or
- through the application of mitigation measures, there would be minor or less effects (i.e., no measureable effects) from the proposal or other alternatives, and there is little or no controversy on the subject or reasons to otherwise include the topic.

Because the action would have no measurable effects, there would be no contribution towards cumulative effects or the contribution would be low. For each issue or topic presented below, if the resource is found in the analysis area or the issue is applicable to the proposal, then a limited analysis of direct and indirect, and cumulative effects is presented. Because the action would have no measurable effects, there is no impairment analysis included in the limited evaluations for the dismissed topics because the NPS's threshold for considering whether there could be impairment is based on "major" effects.

Ethnographic Resources

As described in DO-28: *Cultural Resource Management*, an ethnographic resource is defined as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it." Ethnographic resources in Minute Man NHP are represented by the farming activities operated through the NPS leasing programs and cooperative agreements. The proposed action will not impact existing farming activities within Minute Man NHP. Therefore the impact topic of ethnographic resources is dismissed from further analysis in this document.

Vegetation

NPS policy is to maintain native plants by preserving and restoring the natural abundance, diversities, dynamics, distributions, and habitats of native plants populations and the communities and ecosystems in which they occur. Further, the NPS will minimize human impacts on native plant populations, communities, and the ecosystems and processes which sustain them (NPS, 2006). The actions proposed in this plan would not affect vegetation in any way. The impacts to vegetation would be less than negligible. Therefore, there would be no unacceptable impacts to vegetation and the proposed action is consistent with §1.4.7.1 of NPS *Management Policies 2006*. Because these effects are less than negligible in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Lightscapes

In accordance with *Management Policies 2006*, the NPS strives to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human caused light. The proposed action would not change or add to existing lighting in the park. The effects of the proposed action on the lightscape would be less than negligible. Such impacts would not result in any unacceptable impacts and the proposed action is consistent with §1.4.7.1 of NPS *Management Policies 2006*. Because these effects are less than negligible and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 et seq.) was established to promote the public health and welfare by protecting and enhancing the nation's air quality. The Act establishes specific programs that provide special protection for air resources and air quality related values associated with NPS units. Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. The Clean Air Act and NPS *Management Policies 2006* require consideration of air quality impacts from NPS projects. The proposed actions would have minimal beneficial impacts on air quality. Park operations may move toward hand-held, non-motorized, or electric equipment rather than gas-powered motorized equipment. These technologies generally have less carbon output than gas-powered motors. Because these effects are less than negligible in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Water Resources

NPS *Management Policies 2006, §4.6* states that the NPS will "take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water

Act and all other applicable federal, state, and local laws and regulations." Despite its relatively small size, the undeveloped nature of the Battle Road Unit makes it an important piece of the rapidly developing watershed.

There are a number of named and unnamed streams and ponds within the park. The most notable are Cook's Pond, just north of the Bluff, Folly Pond, just southwest of the Paul Revere Capture Site, and the kettlehole wet meadow south of Lexington Road in Concord. Elm Brook is another notable body of water, bisecting the park east of the Brooks complex. A third stream, Mill Brook, forms the unit's northwest boundary before crossing through Meriam's Corner. There are several other small ponds in the eastern end of the unit near the Bluff and Fiske Hill.

Water quality within the park faces the same threats as the rest of the region. Storm water runoff from roads, agricultural fields, and residential developments is the primary threat. Industrial deposition of heavy metals and leachate from septic systems inside and outside the park also threaten water quality. These conditions have caused the surrounding bodies of water, including the Concord River, to periodically exceed the Environmental Protection Agency's criteria for dissolved oxygen, pH, and dissolved copper. The levels of total coliform and fecal coliform concentrations also have exceeded limits for freshwater bathing. The high levels of nitrogen and phosphorus included in these pollutants have created eutrophic conditions in the Concord River. This means that the level of aquatic vegetation impairs water quality. Water quality conditions in the area are also reflected in the state's 303(d) list. All rivers and lakes in Massachusetts are on the 303(d) list for Fish Consumption Advisory for mercury. Elm Brook is also listed on the state's 305(b) list for being impaired by nutrients, pathogens, and turbidity.

The actions identified in this document would not affect existing water resources. Water resources would not be degraded or lost due to the implementation of the proposed actions in this plan. Further, such impacts would not result in any unacceptable impacts and the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies 2006.* Because these effects are less than negligible in degree and would not result in any unacceptable impacts, this topic is dismissed from further analysis in this document.

Wetlands

NPS DO-77-1: *Wetland Protection* and Executive Order 11990: *Protection of Wetlands* provide guidelines for the protection of wetlands within NPS units. It states a policy of no net loss of wetlands and provides a process for evaluating actions that have a potential to have adverse effects on wetlands. Wetlands are prevalent within different portions of the Minute Man NHP mainly along river margins and floodplains, and as isolated wetlands associated with small impoundments. The actions identified in this document would not affect wetland characteristics or functions. Wetlands would not be degraded or lost due to the implementation of the proposed actions in this plan. Further, such impacts would not result in any unacceptable impacts and the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies 2006.* Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Floodplains

Executive Order 11988 (*Floodplain Management*) requires an examination of impacts to floodplains and potential risk involved in placing facilities within floodplains. NPS *Management Policies 2006* and DO-12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* provide guidelines for proposed actions in floodplains. The actions identified in this document would not affect floodplains in the park. The proposed actions would have no effect on floodplain functions resulting in no unacceptable impacts and the proposed actions are consistent with §1.4.7.1 of NPS *Management Policies 2006.* Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Geologic and Soil Resources

According to the NPS *Management Policies 2006*, the NPS will preserve and protect geologic resources and features from adverse effects of human activity, while allowing natural processes to continue. These policies state that the NPS will strive to understand and preserve the soil resources of park units and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. The proposed action would not disturb any geologic feature or any soils in the park. This would result in negligible (or less) impact to geology and soils. Further, the proposed action would not result in any unacceptable impacts and are consistent with §1.4.7.1 of NPS *Management Policies 2006*. Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Prime and Unique Farmlands

Prime farmland is one of several designations made by the U.S. Department of Agriculture to identify important farmlands in the United States. It is important because it contributes to the nation's short-range and long-range needs for food and fiber. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, few to no rocks, and permeable soils (designated as prime farmland soils). Approximately 17% of the lands within Minute Man NHP are designated as prime farmland. No changes are proposed to these lands; therefore, the impact topic of prime farmland soils was dismissed.

Archeological Resources

The National Historic Preservation Act (NHPA), as amended in 1992 (16 U.S.C. 470 et seq.), NEPA, NPS Organic Act, NPS *Management Policies 2006*, DO-12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*, and DO-28: *Cultural Resource Management* require consideration of impacts on cultural resources, including archeological resources. The process and documentation required for preparation of this EA will be used to comply with Section 106 of the NHPA. The actions described in this EA would have no adverse effect on archeological resources, resulting in no unacceptable impacts. The proposed actions are consistent with §1.4.7.1 of NPS *Management Policies 2006*. Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Museum Collections

According to DO-24: *Museum Collections Management*, the NPS requires the consideration of impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, NPS museum collections. The primary goal is preservation of artifacts in as stable condition as possible to prevent damage and minimize deterioration. The proposed actions would not affect the museum objects of Minute Man NHP and there is no potential to add objects to the collection because of the actions, resulting in no unacceptable impacts. The proposed actions are consistent with §1.4.7.1 of NPS *Management Policies 2006*. Because these effects are negligible or less in degree and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts on Indian Trust resources from a proposed project or action by U.S. Department of the Interior agencies be explicitly addressed in environmental documents. The federal Indian Trust responsibility is a legally enforceable obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal laws with respect to Native American tribes. There are no known Indian Trust resources in the study area, and the lands comprising the park are not held in trust by the Secretary of the

Interior for the benefit of Indians due to their status as Indians. Therefore, the impact topic of Indian Trust resources and Sacred Sites is dismissed.

Environmental Justice

Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* – February 11, 1994), requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. The proposed actions in this plan would not disproportionately affect any group because of race or income, and would not have disproportionate health or environmental effect on minorities or low-income populations or communities as defined in the Environmental Protections *Agency's Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis* – April 1998. Because the actions would not have any disproportionate effects and would not result in any adverse unacceptable impacts, this topic is dismissed from further analysis in this document.

Climate Change and Sustainability

Although climatologists are unsure about the long-term results of global climate change, it is clear that the planet is experiencing a warming trend that affects ocean currents, sea levels, polar sea ice, and global weather patterns. Although these changes will likely affect winter precipitation patterns and amounts in the parks, it would be speculative to predict localized changes in temperature, precipitation, or other weather changes, in part because there are many variables that are not fully understood and there may be variables not currently defined. Therefore, the analysis in this document is based on past and current weather patterns and the effects of future climate changes are not discussed further.

Public Safety

Providing a safe and healthy park experience is always at the forefront of NPS plans. This is especially true when new developments or changes in vehicular and pedestrian circulation are planned. Safety concerns related to these plans are addressed under the impact topic of visitor use and experience.

Socioeconomics

The proposed action would not change local or regional land use or appreciably impact local business, other agencies, or properties adjacent to the park. Implementation of the actions proposed in this plan would not increase or decrease the local or regional workforce or revenues for local businesses or governments. Because there would be no measurable effects, this topic is dismissed from further analysis in this document.

ALTERNATIVES

ALTERNATIVE A - NO ACTION ALTERNATIVE, CURRENT MANAGEMENT

In accordance with CEQ NEPA guidance, this no action alternative for management of the acoustic environment represents no change from current management direction or level of management intensity. The no action alternative involves continuing with the present course of action expressed in existing park management documents. Management would be guided by the existing documents and the Acoustic Resource Management Plan (ARMP) would not be adopted. The Minute Main NHP Foundation document, completed in 2014, describes 1) the overall significance of the park, 2) the fundamental resources and values, 3) other important resources and values and 4) research and planning priorities. Descriptions of significance, threats or opportunities in the Foundation Document support the need for this ARMP through the following statements:

Threat to Battle Road and Cultural Landscape:

- Commercial and residential development at the park's borders and Massport's operations at the Hanscom Field civilian airfield generate increasing amounts of traffic with associated noise, pollution, and pressure to alter the Battle Road. The potential expansion of Hanscom Field could increase such impacts further.

Desired condition for Battle Road and Cultural Landscape:

- The park, the state, and local communities must ensure safe visitor access to all park facilities along the Battle Road. Management entities would reduce traffic speed, volume, and noise through traffic enforcement, traffic calming, and adopting guidelines for appropriate paving, lighting, and safety features.

Threats to Contemplative Visitor Experience:

- Increasing traffic on Battle Road/Route 2A and other nonpark roads can negatively impact the visitor experience.
- Noise from Route 2A traffic and air traffic from Massport's activities at Hanscom civilian airfield make it difficult to offer visitors a contemplative experience, including appropriate natural and cultural soundscapes.
- Development in viewsheds along park boundaries can negatively impact the historic scene.

Desired condition for Contemplative Visitor Experience

- The soundscape should be managed to foster a more contemplative environment appropriate to a commemorative and historical setting.
- Continuing landscape rehabilitation would improve the visitor experience and enhance the "sense of place."

Threat to Natural Resources

- Minute Man National Historical Park is rated in a 2008 report by the Coalition of National Park Service Retirees as one of the top five noisiest parks in the United States. The condition of the soundscape is rated as "significant concern." Noise from the highway and aircraft flights can have negative effects on wildlife populations.

Desired Condition for Natural Resources

- Improve the park's natural resources from the conditions of "caution" and "significant concern."

The GMP, completed in 1989, provides details on strategies and actions to address resource problems and research needs. Cultural and natural resources are to be managed in a comprehensive and integrated way for the maintenance of resources and prevention of impairment. The GMP supports the importance of protecting the natural and cultural sounds through the following statements:

- Several types and degrees of incompatible land uses intrude on the historic scene of the park. Road noise is a major intrusion; the noise intensity varies from the multilane, limited access Route 128, to the two-lane, heavily used Route 2A, and to local lanes such as Mill Street and Bedford Road. Airplane noises from civilian and military flights at Hanscom Field are heard throughout the park.

- High density, rapid growth, and a booming economy have pushed residential, commercial, and industrial development closer and closer to the park. This development has brought with it increased traffic, noise, and density that interfere with the congressional purpose of the park and impair the visitors' experience of park resources.

- Residential development patterns in the area are mainly low density suburban with preponderance of single-family homes that create 20th-century intrusions (traffic, noise, and visual impacts). Office, commercial, and light industrial development also occur near the park, and impacts of these land uses are much greater and more difficult to mitigate.

- Adjacent to the Air Force Base is Laurence G. Hanscom Field, a public airport owned and operated by the Massachusetts Port Authority (MASSPORT). While the airport is not directly visible from the park, increasing airplane noise and air and ground traffic generated by the airport have negative impacts on the park. Hanscom Field is the second busiest airport in New England.

- Specific concerns for the park presented by Route 2A include the following: Everywhere in the park traffic noise is a constant intrusion to visitors.

Management Goals and Objectives from GMP:

- The park would, wherever possible, restore the cultural landscape to 1775 and provide visitors with an opportunity to walk on trails along The Battle Road and through the surrounding fields.

- The plan proposes to separate the visitors' experience of the park from modern development, particularly traffic, which currently disrupts their enjoyment and understanding of the park; to preserve historic buildings; to remove or screen modern visual intrusions; and to improve the signs and exhibits for visitor information and orientation.

- Protect all cultural resources associated with the park, including the historic Battle Road, historic structures, historic landscape setting, and archeological resources.

- Reduce adverse effects of increasing traffic on The Battle Road, the historic scene, and the visitor experience, through coordinated planning efforts with the state, towns, and regional traffic management groups.

- Protect and restore the historic scene of April 19, 1775, or the landscape and associated cultural resources in selected areas. Develop a landscape management plan to establish priorities for restoration, screening of modern intrusions, and agricultural leasing, and address long-term maintenance requirements.

Strategies

Park managers will continue to follow several policies and practices to minimize noise from both land and air sources. These policies and strategies include:

- NPS will work with Massport to assess impacts from Hanscom Field
- Park Rangers will monitor and enforce traffic speed on Route 2A to reduce traffic noise
- NPS will continue to enforce existing noise policies
- Noise will be a consideration when procuring and using park equipment

ALTERNATIVE B - PROPOSED ACTION

This alternative includes the development of an ARMP for Minute Man NHP. The alternative describes appropriate and inappropriate sound sources, acoustic environment objectives, acoustic indicators and standards, monitoring approaches and protocols, and methods for modifying the ARMP using an adaptive management approach.

Management Zones

Previous planning efforts at Minute Man NHP identify management zones which guide the kinds of activities and developments that are appropriate to the purposes of the park. The two zones are the Development Zone and the Historic/Commemorative Zone. The Development Zone includes areas developed to serve visitor needs or park management and administration. The Developed Zone is where development or intensive use substantially alters the historic or natural setting. The Development Zone includes the Route 2A corridor which is managed to preserve as much of the historic Battle Road and its associated landscape as possible. This is sometimes referred to as the Scenic Byway Corridor. A map of the Scenic Byway Corridor for Battle Road Unit is in Figure 2.

The Historic Zone includes the Preservation, Preservation/Adaptive Use, Commemoration, and Landscape subzones. These zones include lands managed for cultural resources, aesthetic value, historic significance, agriculture, or open space. For this ARMP, these are collectively included in the Historic/Commemorative Zone. All areas that are not in the Developed Zone are in this zone. Most of the park lies within this zone.

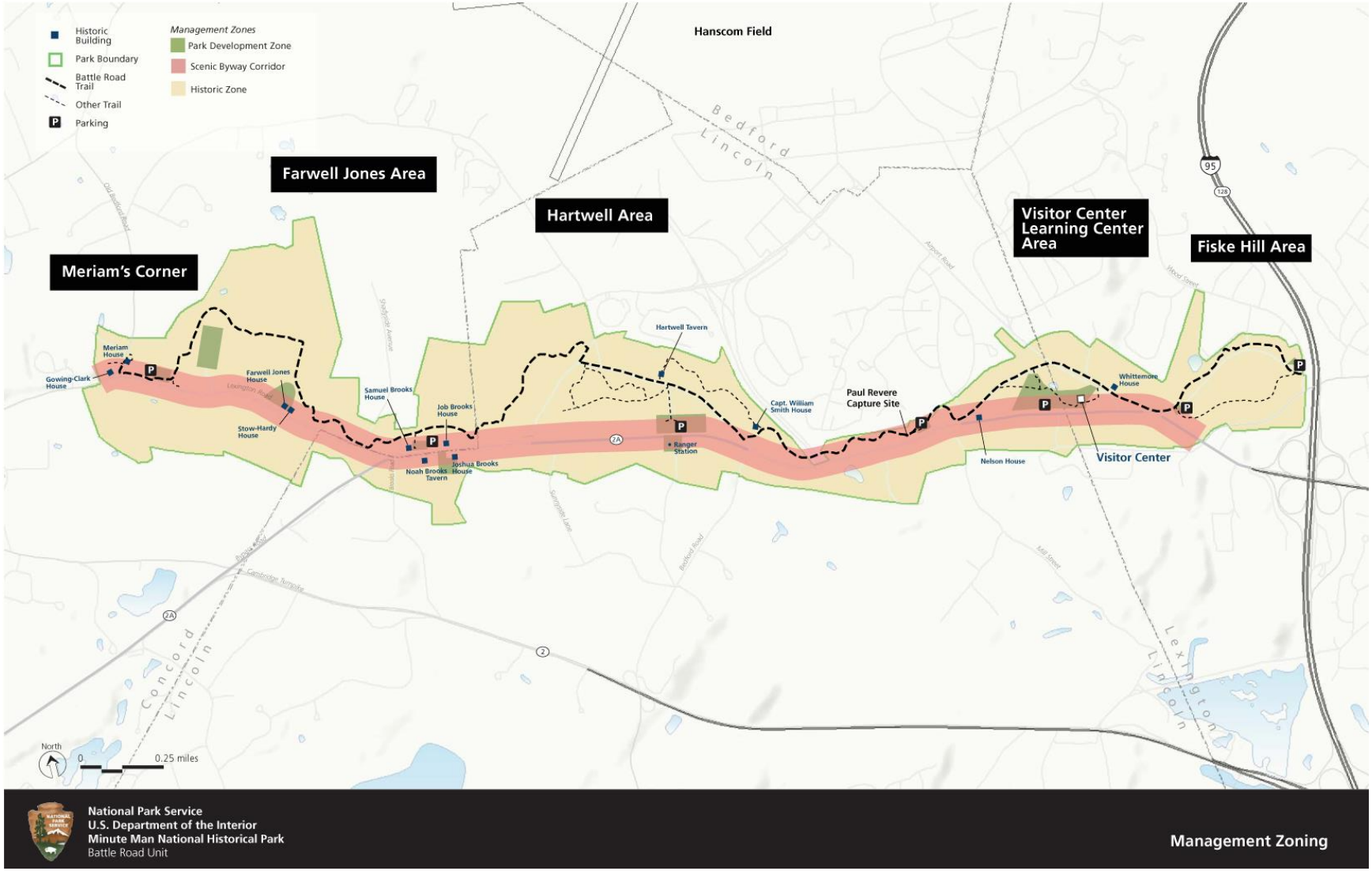

Figure 2. Minute Man Management Zones for Battle Road Unit.

Desired Acoustic Conditions

The following are desired acoustic conditions for the Historic/Commemorative Zone and Development Zone:

Historic/Commemorative Zone: Natural and appropriate cultural and historic sounds dominate the area and the acoustic environment contribute to a contemplative setting that allows visitors to feel a sense of connections to events related to the American Revolution that occurred there in April 1775. Human-caused sounds are common in some areas within the zone including areas adjacent to motorized travel corridors, open fields, and visitor use areas. Sounds related to interpretive activities and living history can be heard. Interpretive programs and events can be conducted without interruption or interference from noise.

Development Zone: Human-caused sounds including the sound of vehicular traffic, park maintenance, management actions, and visitor activities are common in this zone. However, human caused sounds that diminish the commemorative character of Battle Road within the Park or compromise the visitors' experience of the park occur infrequently. Natural sounds can also be heard. Cultural and historic sounds associated with the preservation and interpretation of sites associated with the causes and consequences of the American Revolution will be audible within this zone.

Sound Sources and Sound Levels Consistent With Park Legislation and Purposes

It is inferred in this plan that the human-caused sounds generated by activities deemed appropriate in the GMP, Foundation Document and other park plans are also appropriate sound sources. Although the sources of these sounds are appropriate, the GMP and Foundation Document also recognize that some noise associated with them is excessive, and should be mitigated to the greatest extent possible. Generally, mitigation can consist of educating park visitors, staff, and volunteers; reducing the sound level, duration, frequency of occurrence; or changing the frequency spectrum of the sound to one less obtrusive in the acoustic environment.

Table 1 and Table 2 identify the appropriate sound sources for each zone and management actions that should be considered to minimize the impact of that sound. Management actions are noted below.

Table 1: Appropriate Sound Sources for Historic/Commemorative Zone

Appropriate Sound Sources	Management Actions
People	
Sounds of recreation, education, and interpretation (e.g., visitors, interpretative programs)	▪ Encourage and remind visitors to limit noise, shouting, and loud conversations ▪ Develop and implement educational and interpretive programs on sounds ▪ Encourage and remind visitors to limit noise, turn off cell phones, deactivate beepers on cameras, reduce volume on audio players, use earphones or earbuds
Routine Park Operations/NPS Facilities/Maintenance	
Building maintenance, building operation (HVAC, back-up generators), habitat rehabilitation, fuels treatment, weed control, research groups, use of chainsaw and other motorized tools, grounds maintenance	▪ Consider installing quiet pavement to reduce the noise impacts of road/tire interface when repairing or resurfacing park roads. ▪ Conduct inventory of all noise producing activities and noise sources ▪ Prior to purchase of equipment, conduct research to identify the best available technology; Identify and purchase the quietest equipment unless there is an overwhelming reason not to do so ▪ Educate staff on quieter tool choices ▪ Use quieter technology when appropriate ▪ Minimize noise generated by park management activities by regulating NPS use of noise producing machinery ▪ Use construction and maintenance equipment outfitted with back up beepers that use best available technology for noise reduction such as broadband backup beepers or self-adjusting beepers which adjust volume based on ambient sound levels. ▪ Address noise in appropriate NEPA reviews ▪ Have maintenance schedules for all equipment ▪ Use mufflers, barriers or enclosures to reduce noise output when appropriate
Emergency Service and Law Enforcement	
Emergencies and protection actions	▪ All actions planned and evaluated through the park's "go/no go" checklist ▪ Conduct minimum requirement procedures and appropriate NEPA analysis, except for emergency actions ▪ Use quiet technology when appropriate ▪ Enforce existing noise ordinances (36 CFR §2.12)
Natural and cultural sounds	
Historical, agricultural, reenactments, natural sounds	▪Actions in this plan with reduce ambient sound levels and improve ability for visitors to experience ▪The protection of natural and cultural sounds will be considered when determining location and timing of reenactments ▪Proximity to historical, agricultural and natural sounds sources will be a consideration when noise-causing activities are initiated

Table 2: Appropriate Sound Sources for Development Zone

Appropriate Sound Sources	Management Actions
People	
General: e.g. voices	▪ Engage in visitors to be respectful of others by not shouting, yelling, loud conversations, or producing other excessive noise through visitor contact, signage or interpretive materials ▪ Encourage and remind visitors to limit noise, turn off cell phones, deactivate beepers on cameras, reduce volume on portable music players ▪ Add article in park paper on the importance of natural and cultural sounds
Interpretive talks for visitors	▪ Limit use of amplification. Use only when necessary and to the minimum level necessary (evening programs at amphitheaters and interpretive tours on shuttle bus, etc.) Consider use of headsets or cell phone programs to deliver interpretive messages in sensitive areas.
Vehicles	
Visitors e.g. – idling vehicles, generator use, security alarms	▪ Encourage maintenance and delivery trucks to deactivate back-up beepers where appropriate.▪ Work with delivery companies to determine appropriate times for deliveries ▪ Enforce existing noise ordinances (36 CFR §2.12)
Vehicles on Route 2A	▪ Improve signage on road to inform vehicle drivers that they have entered the Park ▪ Consider installing a roadside vehicle noise display to increase awareness and educate park visitors on effects of noise from vehicles. ▪ Consider installing quiet pavement to reduce the noise impacts of road/tire interface when repairing or resurfacing park roads. ▪Post "No Idling" signs in additional parking lots ▪Enforce speed limits because vehicles traveling at slower speeds emit lower noise levels.
Tour buses, shuttle buses, public address systems on buses/shuttles	▪Post additional "No Idling" signs in parking lots ▪ Continue to require bus tour companies to comply with regulations that reduce noise levels (e.g., turning off engines when buses are parked). ▪ Enforce existing noise ordinances (36 CFR §2.12).
Routine Park Operations/NPS Facilities/Maintenance	
Building security/fire alarms	▪ Ensure systems are maintained to reduce false alarms.
Leaf blowers, lawn mowers, other gas-powered hand tools	▪ Minimize the use of leaf blowers, chainsaws, and other mechanical equipment and consider other products that accomplish the same thing (handheld non-power tools, brooms, rakes, electric powered mowers or trimmers, etc.) ▪ Minimize noise generated by park management activities by modifying NPS use of noise producing machinery ▪ Consider quiet technology when replacing equipment. Prior to purchase, research will be conducted in regard to the best available technology and the quietest equipment will be identified and purchased unless there is an overwhelming reason not to do so

Appropriate Sound Sources	Management Actions
Heavy equipment for construction and other activities (maintenance, etc.)	▪ Consider the effects of noise when deciding on the equipment needed to perform a task ▪ Use construction and maintenance equipment outfitted with back up beepers that use best available technology for noise reduction such as broadband backup beepers or self-adjusting beepers which adjust volume based on ambient sound levels. ▪ Noise should be addressed through appropriate NEPA analysis ▪ Consider quiet technology when replacing equipment. Prior to purchase or contracting, research will be conducted in regard to the best available technology and the quietest equipment will be identified and purchased unless there is an overwhelming reason not to do so ▪Minimize noise generated by park management activities by regulating NPS administrative use of noise producing machinery and motor vehicles ▪Follow maintenance schedules for all machinery to ensure efficient operation and to reduce noise ▪Ensure that machinery and tools have mufflers and other noise reduction equipment ▪Consider using noise enclosures and portable noise barriers during construction or maintenance projects
Protection/Administration/Law Enforcement	
Administrative vehicles	▪ Increase the use of quiet technology where appropriate ▪ Encourage alternate forms of transportation when traveling in the park (shuttle, walk, bike, carpool, etc.) ▪ Minimize noise generated by park management activities by regulating NPS administrative use of noise producing machinery, including motor vehicles ▪ When replacing vehicles, consider hybrid or full electric vehicles ▪Noise will be a consideration when procuring, contracting, and using park equipment. Prior to purchase, research will be conducted in regard to the best available technology and the quietest equipment will be identified and purchased unless there is an overwhelming reason not to do so ▪Follow maintenance schedules for all vehicles ▪Ensure vehicle mufflers are installed and functioning correctly
Natural and cultural sounds	
Historical, agricultural, reenactments, natural sounds	▪Actions in this plan with reduce ambient sound levels and improve ability for visitors to experience ▪The protection of natural and cultural sounds will be considered when determining location and timing of reenactments ▪Proximity to historical, agricultural and natural sounds sources will be a consideration when noise-causing activities are initiated

Sound Sources and Sound Levels Not Consistent With Park Legislation and Purposes

Other sources of human-caused sound that exist in, or affect the park are not consistent with park purposes. Minute Man NHP management and staff are obligated under law, policy, and in accordance with the GMP and Foundation Document, to take steps in addressing inappropriate sound sources. Table 3 lists management concerns that generally originate from beyond the park boundary or in the airspace above the park. The park does not have the authority to control all of these sound sources, but the park is committed to working with adjacent property owners, appropriate federal, state, and local agencies, and organizations to mitigate potential impacts to acoustic resources.

Table 3: Management Concerns - Not Consistent With Park Legislation and Purposes

Management Concerns	Potential Management Actions
•Commercial aviation •General aviation •Excessive noise from commercial uses •Amplified communication devices • Excessive noise from traffic	▪ Collaborate with adjacent property owners, appropriate federal, state, and local agencies, and organizations through the following efforts: ▪ Engage in the planning efforts of other entities to avoid potential impacts to the park acoustic environment. Seek cooperating agency status when appropriate. ▪ Work with FAA, state and local government, and other parties in developing plans for new or expanded airport facilities, or altered flight routes, that affect the park. ▪ Work with adjacent land owners, local town government, or other land management jurisdictions to mitigate impacts of sources of noise from those lands. ▪ Encourage the use of non-motorized or quieter motorized technology. ▪ Establish partnerships to develop and implement quieter technology to protect the acoustic environment of Minute Man NHP. ▪ Consider installing quiet pavement to reduce the noise impacts of road/tire interface when repairing or resurfacing roads in and adjacent to the park.

Acoustic Environment Objectives

This section describes the acoustic resource management objectives for the Historic/Commemorative and Development zones. The objectives are based on and are compatible with the descriptions of park management zones provided in the GMP and Foundation Document. The objectives support the overall desired conditions for acoustic resource management.

Acoustic Resource Objectives for the Historic/Commemorative Zone

- Natural sounds are audible and discernible, except for short duration, infrequent human-caused sounds that are consistent with other management objectives for this zone.
- Audible vehicular noise from the Route 2A corridor is of low to moderate intensity
- Historically appropriate sounds (muskets, livestock, fife and drum corps, etc.) are audible during interpretive activities and events.
- Noise levels that interfere with general conversation are very rare and are of a very limited duration except when caused by emergency services (sirens).
- Noise levels that interfere with interpretive programs do not occur except when caused by emergency services and search and rescue operations (sirens, additional vehicles)

- Noise levels are consistent with other management objectives for this zone and rarely affect the ability of wildlife to function (communication, effective use of habitat, etc).

Acoustic Resource Objectives for the Development Zone

- Natural sounds are audible and discernible, with common noise intrusions by visitors, transportation, and park operations. Active intensive management is used to maximize noise-free intervals and limit the intensity and duration of noise intrusions.
- Historically appropriate sounds (muskets, livestock, fife and drum corps, etc.) are audible during interpretive activities and events.
- Noise levels that interfere with general conversation rarely occur and are of limited duration except when caused by emergency services (sirens).
- Sound levels that interfere with interpretive programs do not occur except when caused by emergency services (sirens).
- Noise levels occasionally affect the ability of wildlife to function (communication, effective use of habitat, etc), but are consistent with other management objectives for this zone.

Indicators and Standards

The following acoustic indicators are used to determine the extent to which acoustic resource objectives are being met. For each indicator, a standard is prescribed (Refer to Table 6 and Table 7). In the performance of monitoring, a violation of a standard shows that objectives are not being met or that the use or activity is not in compliance. The discussion describes the data collection and analysis required to monitor the indicator and the extent and duration of the monitoring program required to track compliance with acoustic resource objectives and standards.

Time audible. Time audible or "audibility" is one of the ways NPS measures or characterizes the acoustic environment in national park units. This is the percentage of time during a 12-hour day that human-caused sounds can be heard by the human ear at a given location. For example, 25 percent time audible (TA) means human-caused sounds could potentially be heard in specified areas for 25 percent of the day, or three hours during a 12-hour day – not necessarily consecutive hours.

Sound Level. Sound levels are expressed using two metrics: *Deviation from Natural Ambient* and *Maximum Sound Levels*.

Deviation from Natural Ambient is the difference between the average sound level and the natural ambient condition. This metric reports the difference between the average hourly sound level, including all natural and human-caused sounds, and the hourly natural ambient. It represents the extent to which human-caused sounds raise the natural ambient levels. This metric does not provide information on event duration or timing, nor does it mean that human-caused sound levels cannot be heard at or below the ambient. It means that the sound levels produced by human sources are above the natural ambient sound level.

Deviation from natural ambient is depicted in Figure 3 as the gray shaded area and can have important implication for the protection of visitor experience, wildlife, and other natural resources. For example, deviation from natural ambient can be used to identify reductions in listening area and alerting distance. Reduction in listening area is intended to quantify the loss of hearing ability to humans and animals as a result of an increase in ambient noise level. Under natural ambient conditions a sound is audible within a certain area around a visitor or animal. If the ambient level is increased due to a noise event, the area in which a sound of interest is audible decreases. Table 4 and Figure 4 illustrate the relationship between increased ambient and listening area reduction.

For example, under natural ambient conditions, an owl perched in a tree may be able to hear a mouse scurrying through the brush anywhere within an area of 100-square-meters of the perch. If a noise event increases the ambient level by 3 decibels (dBA), the area in which the owl can hear a mouse would decrease by 50 percent to approximately 50-square-meters.

Reduction in alerting distance is closely related to reduction in listening area. Instead of addressing losses in terms of an area, reduction in alerting distance expresses the reduction as a linear distance from a source. For example, under natural ambient conditions, a bird enthusiast may be alerted to the call of a rare species at a distance of 100 meters. If a noise such as an aircraft overflight increases the ambient level by 3 dBA, the distance at which a bird could be detected would decrease by 50 percent to approximately 50 meters.

Visitors and wildlife are impacted by their failure to hear natural sounds that would have been audible in the absence of noise: a bird misses the sound of a worm, a mouse misses the footfall of a coyote, and a visitor misses the sound of a bird call. Reductions in listening area and alerting distance capture these types of impacts.

Deviation from ambient is calculated from sound pressure data collected at the park using a type 1 sound meter. Data are typically collected at multiple sites for 30 days to fully represent the acoustic environment.

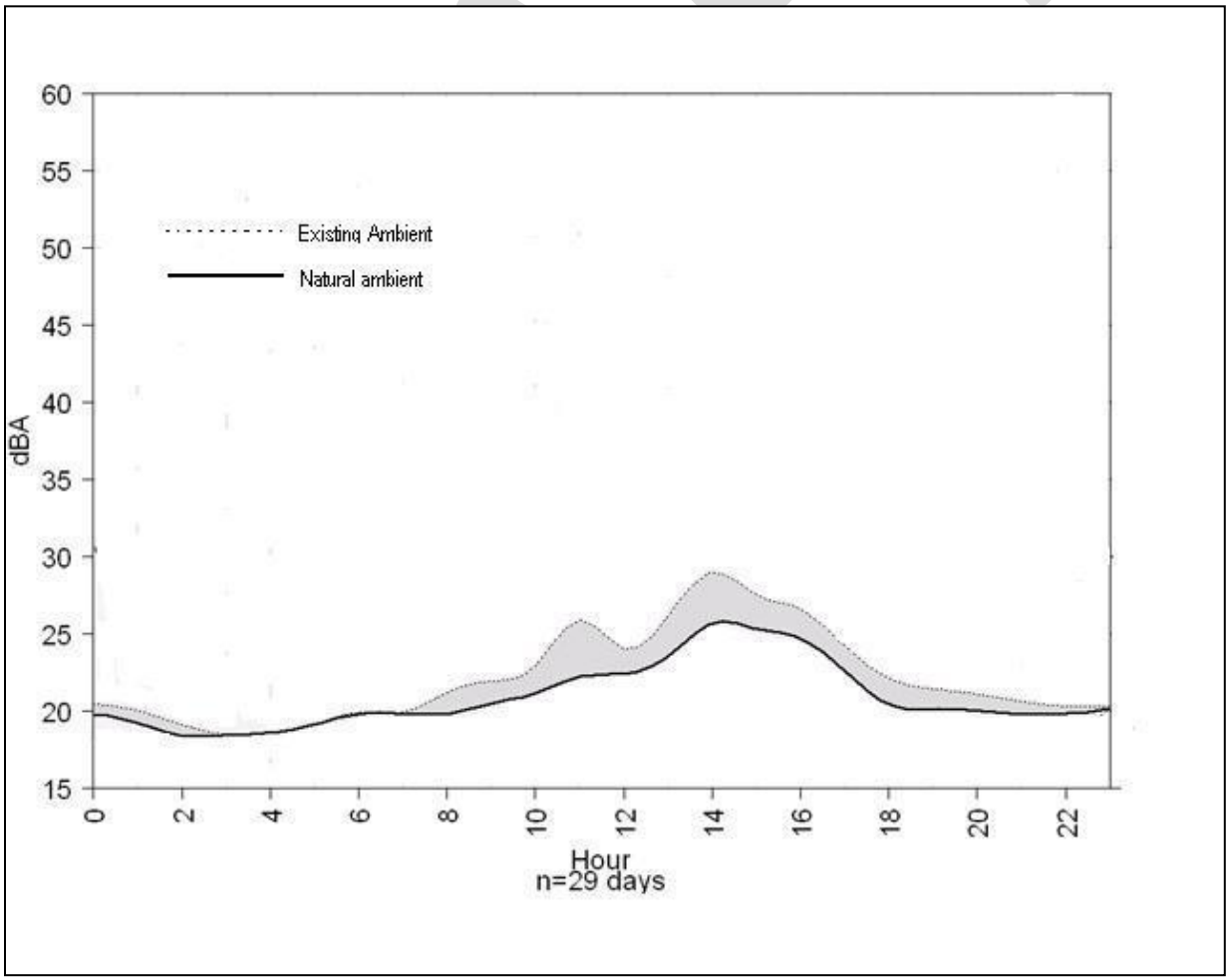

Figure 3. Deviation from Natural Ambient

Table 4: Reduction in Listening Area Due to Increases in Ambient Levels

dBA Ambient Increase	3	6	10	20
Percent Reduction in Listening Area	50%	75%	90%	99%
Percent Reduction in Alerting Distance	30%	50%	70%	90%

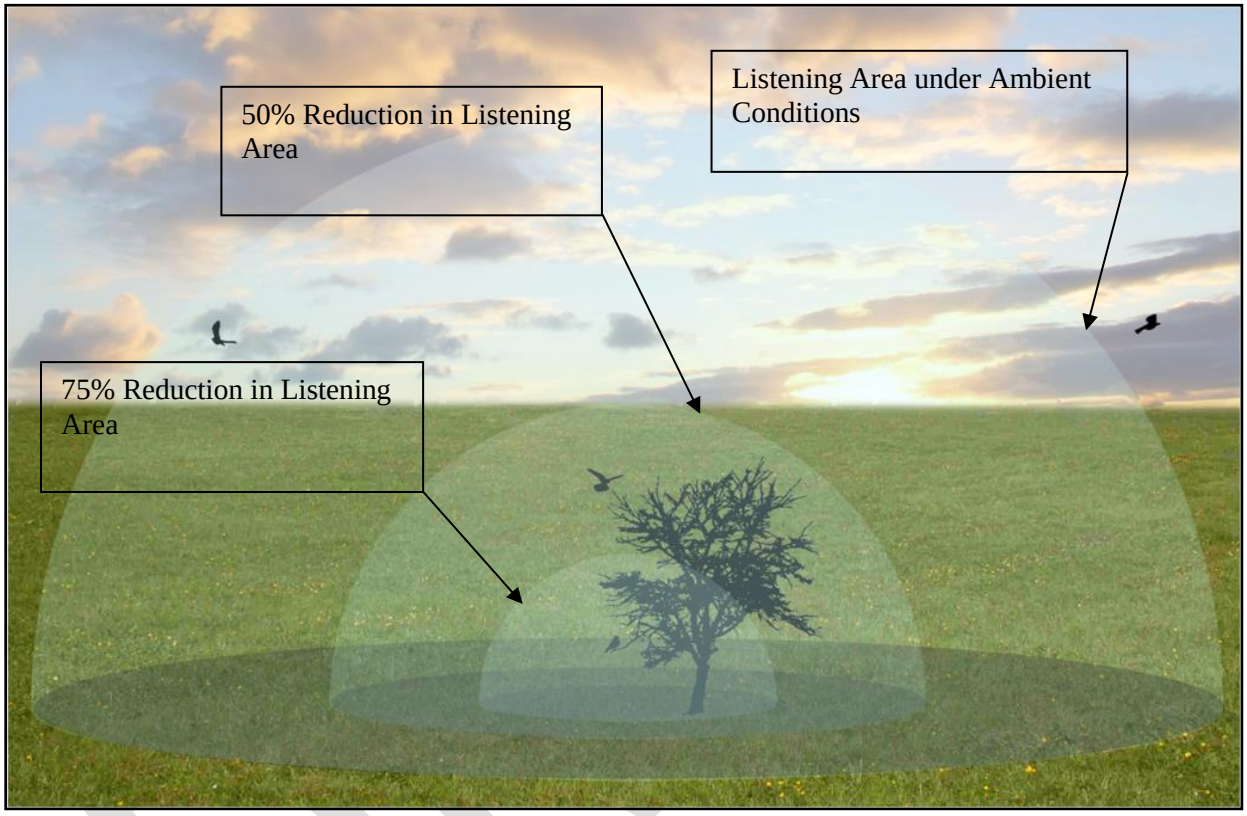

Figure 4. Reduction in Listening Area

Maximum Sound Level (Lmax) is the loudest sound level in an A-weighted decibel (dBA) generated during a noise event at a given location. As a point of reference, some common sound sources and their typical source level are included in Table 5. Perceived sound levels of noise events can vary depending on the receiver's distance to the source, location, topography, vegetation, biological activity, and weather conditions.

Table 5: Representative source levels

Decibel level (dBA)	Sound Source	Decibel level (dBA)	Sound Source
0	Threshold of human hearing	80	Snowcoach at 30 m (Yellowstone NP)
10	Volcano crater (Haleakala NP)	100	Thunder (Arches NP)
20	Leaves rustling (Canyonlands NP)	120	Military jet, 100m above ground level (Yukon-Charley Rivers NP)
40	Crickets at 5 m (Zion NP)	126	Cannon fire at 150m (Vicksburg NMP)
60	Conversational speech at 5 m (Whitman Mission NHS)		

Noise Free Intervals (NFI) are time periods during which only natural sounds are audible. For example, a person listening for bird songs for one hour may hear only bird songs and other natural sounds for 10 minutes before it is interrupted by a man-made sound. In this case, the NFI is 10 minutes. NFI data is expressed as maximum NFI, minimum NFI, and median NFI. NFI is calculated from on-site listening data and sound pressure data collected at the park.

Speech Interference represents the amount of time during which noise exceeds levels that interfere with human speech. The potential for speech interference from a noise depends on the distance between the speaker and listener and the acceptable level of intelligibility. Figure 5 illustrates thresholds for speech interference for various distances and intelligibility levels. The percentage of time or number of minutes per day that speech may be adversely affected by noise is calculated from the sound pressure data collected at the park. Using the chart in Figure 5, speech interference thresholds were determined for two different "types" or contexts of speech that are likely to occur at the park: general conversation and interpretive programs.

General Conversation is the type of conversation that occurs between two or more people standing relatively close together (approximately 1-meter) speaking at normal conversational volume. Hikers and visitors viewing scenic vistas in the park would likely fall in this category. Based on 95 percent speech intelligibility and normal voice communications at 2-meter, the EPA's speech interference threshold for this type of conversation is 60 dBA.

Interpretive Program type of conversation occurs during interpretive programs conducted by park staff or other groups (schools, tours, etc.). Interpreters typically speak in a "raised voice" with approximately 10-meters between the speaker and the furthest participants. Based on 95 percent speech intelligibility and raised voice communications at 10-meters, the EPA's speech interference threshold for this type of conversation is 52 dBA. Noises that exceed these thresholds are likely to interfere with interpretive communication. The potential for speech interference is determined by calculating the time that human-caused sounds exceed speech interference thresholds.

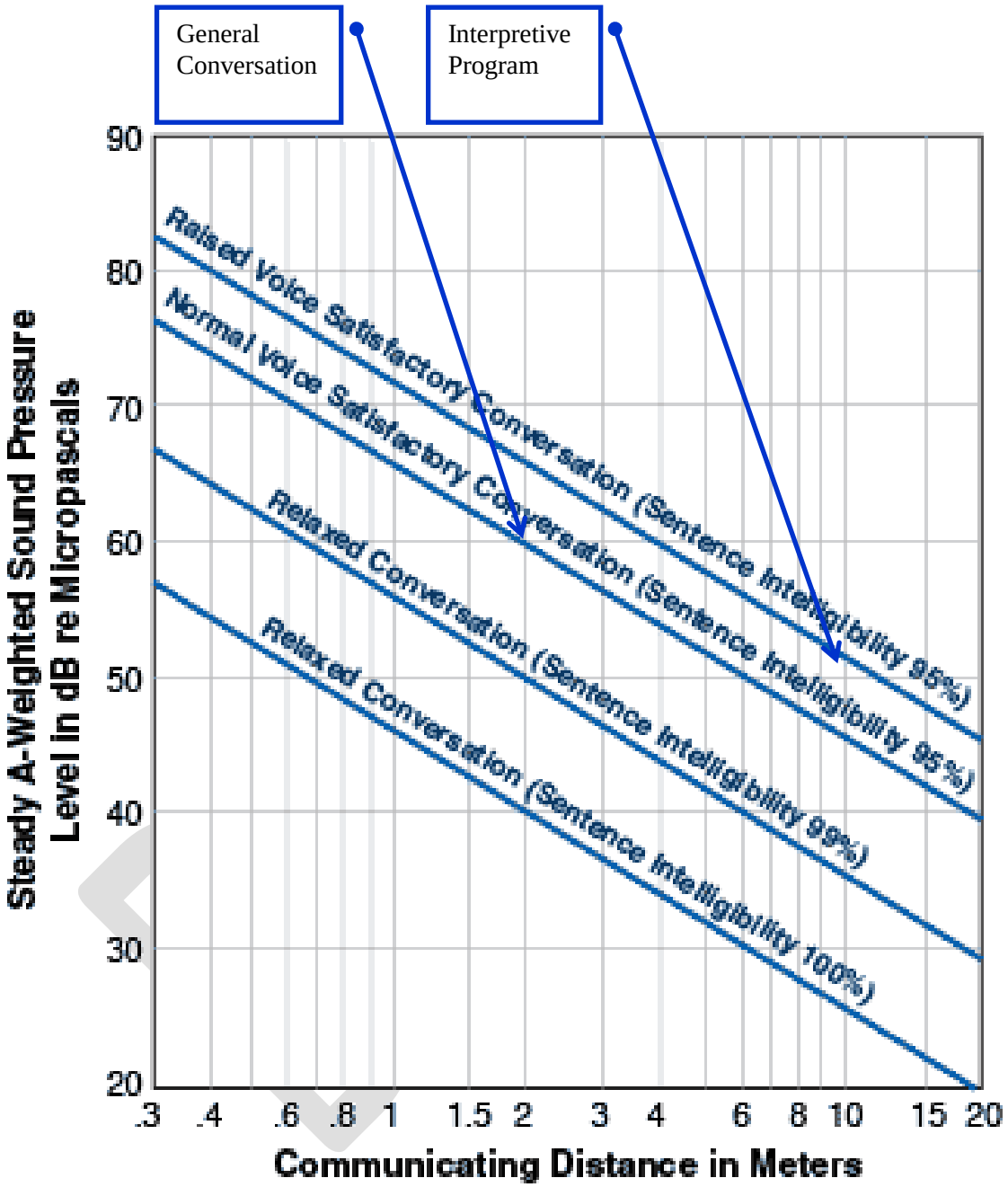

Figure 5. Speech Interference for General Conversation and Interpretative Programs.
Adapted from: US EPA, Information on Levels of Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety, March 1974.

Acoustic Resource Standards

Table 6 and Table 7 provide standards for the Historic/Commemorative Zone and Development Zone, respectively. The rationale supporting each standard is also included in the tables. The indicator will be monitored to determine if the standard is being met. This data would assist the park in determining whether existing management actions are sufficient to protect the park acoustic environment or if additional management actions need to be implemented.

When determining if desired conditions and acoustic resource objectives are being met, it is important to understand acoustic conditions throughout the park. Spatial analyses of acoustic conditions would provide information on the proportion of each management zone that is experiencing desired conditions and the proportion that may be exceeding standards. Initially, acoustic monitoring and analyses would only provide information about acoustic conditions in areas near the monitoring sites. As data are collected at additional sites throughout the Historic/Commemorative and Development zones, conditions can be estimated in terms of the portion of each zone that is in compliance with acoustic standards. In the future as more monitoring data become available it will be possible to assess acoustic conditions throughout the entire management zone. When such data become available, desired acoustic conditions should be maintained below standards in 97 percent of the Historic/Commemorative Zone and 95 percent of the Development Zone.

Table 6: Standards for each indicator for Historic/Commemorative Zone

Indicator	Standard[1]	Rationale
Time audible	▪ The hourly percent time audible is less than 55% for 90% of the day. ▪ The hourly percent time audible never exceeds 82%.	These standards ensure that even though visitors experience highly social conditions in the Historic/Commemorative Zone, they will still have the opportunity to experience natural conditions at certain times. This standard represents a substantial improvement over current conditions and will create incentive to reduce noise levels further. Monitoring by NPS staff indicate daytime time audible of 79% at Hartwell Tavern and 83% near Hanscom Field during summer months. Additional data collected by park staff and volunteers indicated time audible of 95% at Hartwell Tavern and North Bridge. It also ensures management identification and review of areas where human-caused sounds are audible more than 82% of the time. [exceeds standards by 50%]
Sound level	▪ The hourly change in exposure is less than 3 dBA for at least 40% of the day is less than 6 dBA for at least 80%. ▪ Noise events never exceed 60 dBA at 50 feet (CFR Audio disturbance reg.).	This standard represents a substantial improvement over current conditions and will create incentive to reduce noise levels further. For example, currently at Hartwell Tavern, the change in exposure is less than 3 dBA for approximately 20% of the day during the summer. The change in exposure is less than 6 dBA for approximately 50% of the day during the summer.

		The daytime standard ensures that human-caused sound levels will not mask intrinsic natural and cultural sounds in part of the day. An increase of 3 dBA corresponds to a 50% reduction of listening area and a 30% reduction of alerting distance. This condition can only be exceeded for 20% of the day. An increase of 6 dBA corresponds to a 75% reduction of listening area and a 50% reduction of alerting distance. This condition can only be exceeded for 20% of the day.
Noise free interval (NFI)	▪ The daily maximum noise free interval is at least 8 minutes. ▪ The daily median noise free interval is not less than 3 minutes. (over 12 hr. period)	This standard represents a substantial improvement over current conditions and will create incentive to reduce noise levels further. For example, monitoring by NPS staff and volunteers indicated a maximum NFI of 6 minutes and a median NFI of 1:40 at Hartwell Tavern. This standard ensures that enough time occurs between noise events to ensure that visitors to Historic/Commemorative zones will have the opportunity to experience natural sounds free from human-caused noise intrusions. The standard also provides wildlife needed time to recover between noise events.
Time above speech interference thresholds	▪ *General Conversation* Existing ambient sound levels are less than 60 dBA for at least 97% of the day. ▪ *Interpretive Programs* Human-caused sound levels are less than 52 dBA for at least 95% of the day in areas where interpretive programs are conducted. The number of events above 52 dBA does not exceed 1 every 2hrs.	This standard represents a substantial improvement over current conditions and will create incentive to reduce noise levels further. For example, monitoring by NPS staff indicates that daytime sound levels exceed 52 dBA 30% of the day near Hanscom Field and 6% near Hartwell Tavern during Summer months. Daytime sound levels exceed 60 dBA less than 1% of the time near Hartwell Tavern and 2% of the time near Hanscom Field during summer months. The *General Conversation* standard ensures that human-caused sound will not interfere with speech among visitors involving normal voice levels over a distance of 2-meters for more than 21-minutes-per-day. The *Interpretive Program* standard ensures that human-caused sound will not interfere with interpretive programs involving raised voice levels over a distance of 10-meters for more than 50-minutes-per-day.

Table 7: Standards for each indicator for Development Zone

Indicator	Standard	Rationale
Time audible	▪ The hourly percent time audible is less than 70% for at least 90% of the day. ▪ The hourly percent time audible never exceeds 95%.	These standards ensure even though sounds from transportation, park operations, maintenance, and visitor activities are common in the Development Zone, Visitors will still have the opportunity to experience natural conditions at certain times. This standard represents a substantial improvement over current conditions and will create incentive to reduce noise levels further. Monitoring by NPS staff indicate daytime levels of 79% at Hartwell Tavern and 83% near Hanscom Field during Summer months. Additional data collected by park staff and volunteers indicated levels of 95% at Hartwell Tavern and North Bridge. It also ensures management identification and review of areas where human-caused sounds are audible more than 95% of the time. [exceeds standards by 50%]
Sound level	▪ The hourly change in exposure is less than 3 dBA for at least 30% of the day and is less than 6 dBA for at least 60% of the day. ▪ Human-caused sound events never exceed 60 dBA at 50 feet (CFR Audio disturbance reg.).	This standard represents a substantial improvement over current conditions and will create incentive to reduce noise levels further. For example, currently at Hartwell Tavern, the change in exposure is less than 3 dBA for approximately 20% of the day during the summer. The change in exposure is less than 6 dBA for approximately 50% of the day during the summer. The daytime standard ensures that human-caused sound levels are not likely to mask natural sounds in most of the zone. An increase of 3 dBA corresponds to a 50% reduction of listening area and a 30% reduction of alerting distance. This condition can be exceeded for 70% of the day. An increase of 6 dBA corresponds to a 75% reduction of listening area and a 50% reduction of alerting distance. This condition can be exceeded for 40% of the day.
Noise free interval	▪ The daily maximum noise free interval is at least 6 minutes. ▪ The daily median noise free interval is at least 2 minutes. (over 12 hr. period)	This standard represents a substantial improvement over current conditions and will create incentive to reduce noise levels further. For example, monitoring by NPS staff and volunteers indicated a maximum NFI of 6 minutes and a median NFI of 1:40 at Hartwell Tavern.

		This standard ensures that enough time occurs between noise events to ensure that visitors to Development Zone will have the opportunity to experience natural sounds free from human-caused noise intrusions. The standard also provides wildlife needed time to recover between noise events.
Time above speech interference thresholds	▪ *General Conversation* Human-caused sound levels are less than 60 dBA for at least 95% of the day ▪ *Interpretive Programs* Human-caused sound levels are less than 52 dBA for at least 90% of the day in areas where interpretive programs are conducted. The number of events above 52 dBA does not exceed 1 every 2hrs.	This standard represents a substantial improvement over current conditions and will create incentive to reduce noise levels further. For example, monitoring by NPS staff indicates that daytime sound levels exceed 52 dBA 30% of the day near Hanscom Field and 6% near Hartwell Tavern during Summer months. Daytime sound levels exceed 60 dBA less than 1% of the time near Hartwell Tavern and 2% of the time near Hanscom Field during summer months. The *General Conversation* standard ensures that human-caused sound will not interfere with speech among visitors involving normal voice levels over a distance of 2-meters for more than 36-minutes-per-12 hour day (5-min/hr). The *Interpretive Program* standard ensures that human-caused sound will not interfere with interpretive programs involving raised voice levels over a distance of 10-meters for more than 72 minutes-per-12 hour day.

Monitoring and Adaptive Management

The implementation of this plan requires an assertive and focused monitoring effort. Short-term monitoring is necessary to characterize the soundscape and acoustic environment and to describe the sources of noise that affect it. Long-term monitoring is designed to meet a number of needs including identifying trends in acoustic resource conditions. For proper management, monitoring is necessary for the following reasons:

- Describing the ambient acoustic environment and separating the natural from the human-caused elements (baseline monitoring).
- Determining whether a particular use is in compliance with acoustic environment protection standards or limits provided in the plan (implementation monitoring).
- Determining the effectiveness of specific management actions that could affect the acoustic environment (effectiveness monitoring).
- Determining whether acoustic resource management objectives are being met and that the park is in compliance with its plan (implementation monitoring).
- Verifying that the acoustic monitoring objectives are appropriate to meet park purposes (effectiveness monitoring).
- Validating the specific acoustic standards/limits that have been set (validation monitoring).

- Validating the monitoring methods and protocols; ensuring that they measure what they are intended to measure (validation monitoring).
- Validating links between impact sources and effects on acoustic resources or values (validation monitoring).
- Providing periodic feedback to management about the need for change.

Monitoring is also necessary to implement an adaptive management approach to modify the ARMP, as necessary. Decisions to modify acoustic environment indicators, standards, and other elements of the plan should be based on the results of data collection and analysis conducted as part of the long-term monitoring plan.

The fundamental purpose for monitoring is the identification of resource trends. The overall objectives for monitoring and adaptive management are to provide information to managers about the status and condition of park resources and values relative to law and policy, to assess the long-term effects of management actions on park resources and values, and to adjust the plan as needed as additional data are collected and understanding increases. Monitoring should be conducted throughout the park during various times of the year with the goal of capturing the variability of acoustic conditions throughout the park to the greatest extent possible based on effective use of funds and personnel. The guiding principle for monitoring is to collect purposeful data – even if the amount is limited – rather than collecting a great deal of data that cannot be used to arrive at valid conclusions.

In order to meet the goal of collecting useful data, the park will develop a five year monitoring plan that addresses the following items:

- The management zones to be sampled.
- Specific locations for monitoring, and the planned intensity – frequency of monitoring.
- A schedule (times) for data collection and submittal.
- The staff responsible for monitoring and reporting.

The monitoring plan would be updated every five years.

Sampling schedules may vary from year to year, focusing on different areas within the park, different seasons or different times of day. It is expected that initial monitoring would be intensive, both in geographic and temporal extent, so that correlations can be made and results can be extrapolated. It is also expected that monitoring over time would become less intensive ultimately resulting in a low intensity, long-term, monitoring approach. Initially, routine monitoring should occur for 30 days at each site during each season of the year. In addition, monitoring should occur during special events or activities that may generate acoustic impacts. During monitoring, the following data is collected:

- *Sound Pressure Levels (SPL)* – SPL data are collected in the form of A-weighted decibel readings (dBA) every second.
- *⅓-Octave Bands* – ⅓-octave band data are collected every second. (The ⅓-octave band data ranges from 12.5 Hz – 20,000 Hz when the Larson Davis system is used).
- *Meteorological Data* – Wind speed and direction are collected every second.
- *Audio Recordings* – Continuous audio is also recorded (mp3).
- *On-site Listening* – Generally last for one hour. Staff record the beginning and ending times of all audible sound sources using custom-designed software used in a mobile electronic device (such as iPod or Personal Digital Assistant (PDA). These data provided the basis for the calculated average noise free interval, percent time each sound source was audible, and maximum, minimum, and mean time length (in seconds) of sound source events.

Feedback for management is implicit in monitoring and adaptive management programs. In order for feedback to occur, data must be collected effectively in accordance with a plan. Then, evaluations must be put in meaningful terms for management. A biennial monitoring report should be prepared to provide useful information to park managers.

The report would provide information on the following areas:

- Summarize data collected during the previous two year period.
- Calculate the extent to which standards are being met.
- Identify areas where standards are being violated, primary sources of violations, and possible management actions to resolve the violations.
- Assess the effectiveness of any management actions previously implemented to address acoustic resource issues, adjust actions as necessary.
- Extrapolate the measured conditions to other areas, when possible and appropriate.
- Make recommendations for changes in monitoring locations, protocols, techniques or thresholds that should be considered.
- As data accumulate, report trends in acoustic conditions over time.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with NPS DO-12: *Environmental Impact Analysis,* the NPS is required to identify the "environmentally preferred alternative" in all environmental documents, including environmental assessments. The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the CEQ. The CEQ provides direction that "*the environmentally preferred alternative is the alternative that will promote the national environmental policy as expressed in Section 101 of NEPA, which considered:*

- *Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.*
- *Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.*
- *Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.*
- *Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.*
- *Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.*
- *Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."*

Simply put, this means the alternative that causes the least damage to the biological and physical environment and the alternative which best protects, preserves, and enhances historic, cultural, and natural resources (Question 6a in CEQ 1981). The No Action Alternative may also be considered in identifying the environmentally preferred alternative.

Alternative A - (No Action) does not meet, only minimally meets, or has no relationship to the above six evaluation factors for the following reasons.

- The actions identified in Alternative A do not fulfill our responsibility as trustee of the environment to current and future generations of park visitors or ensure all Americans safe, healthful, and esthetically pleasing surroundings because we are not fully protecting acoustic

resources. Human-caused noise interferes with visitor's enjoyment of the park by masking the sounds of nature. In the future, as visitation increases and development outside the park increases, the ability of visitors to experience the natural environment will diminish under Alternative A.

- The actions identified in Alternative A could have undesirable or unintended consequences on the environment and the natural and cultural aspects of our national heritage would not be fully protected because the alternative does not identify specific mechanisms for protecting park acoustic environment, other than the minimal desired conditions and management actions from the 1989 GMP and Foundation Document. Over time human-caused sounds would likely increase, decreasing the visitor's ability to experience natural and cultural sounds. The increase in human-caused sound could have undesirable effects on wildlife, making it harder for them to hear and find prey or to flee from danger, find mates, and perform basic communication.
- Alternative A neither adds to or takes away from the NPS's ability to achieve balance between population and resource use or enhance the quality of renewable resources.

Alternative B - (Proposed Action) is the environmentally preferred alternative because it best addresses the six evaluation factors for the following reasons.

- It fulfills the responsibilities of each generation as trustee of the environment for succeeding generations and ensures for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings by proactively monitoring the park acoustic environment to determine if standards identified in Alternative B to protect the acoustic environment are being met. Alternative B also identifies management actions that could be implemented to meet the goal of protecting the park acoustic environment.
- Alternative B attains the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences by identifying human-caused sound sources that are appropriate to the management of the park. Alternative B also identifies potential management actions to mitigate any undesirable or unintended consequences of those sound sources.
- Alternative B preserves the important historic, cultural, and natural aspects of our national heritage through the actions identified to protect the park acoustic environment.
- Alternative B achieves a balance between development and resource use that will permit high standards of living and a wide sharing of life's amenities by identifying human-caused sound sources appropriate for the management and enjoyment of the park and identifying actions to mitigate any unwanted adverse effects of those sounds.
- Alternative B neither adds, to or takes away from the NPS's ability to achieve balance between population and resource use or enhance the quality of renewable resources.

No new information came forward from the public during scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Because it meets the purpose and need for the project, the project objectives, and is the environmentally preferred alternative, Alternative B is also recommended as the NPS preferred alternative. For the remainder of this document, Alternative B will be referred to as the Preferred Alternative.

ALTERNATIVES CONSIDERED BUT DISMISSED

In developing alternatives a range of acoustic indicators and standards were considered resulting in three separate action alternatives. Two of the alternatives were dismissed from further analysis because they did not fully meet the purpose and need of the action.

Alternative C - Alternative C included a set of standards and management actions that provided a very high level of protection for both the Historic/Commemorative and Development zones. Levels of

indicators such as time audible, noise free interval, sound level and speech interference were designed to ensure the most protective conditions possible and virtually eliminated human caused sound from much of the park. In order to meet the standards, management actions under this alternative included limiting visitor access below current levels. The alternative did not provide an effective approach to managing the acoustic environment that is consistent with NPS policy as required in the purpose and need for action.

Alternative D - Alternative D included a set of standards and management actions that provided a lower level of protection for both the Historic/Commemorative and Development zones. Levels of indicators such as time audible, noise free interval, sound level, and speech interference provided lower levels of protection for the acoustic environment and allowed for more noise intrusions on the park acoustic environment. Meeting the standards under this alternative, would have provided less protection for the acoustic environment, wildlife, and visitor experience. The alternative did not fully protect the acoustic experience of park visitors or ensured that natural sounds continue to play an important role in the enjoyment of park resources and values. The alternative also failed to protect acoustic conditions for wildlife and the role of the acoustic resources in ensuring healthy and dynamic ecosystems as expressed in the purpose and need. As a result, Alternative D was not consistent with the purpose and need for action and was dismissed from further analysis.

ALTERNATIVE SUMMARIES

Table 8 summarizes the major components of Alternative A and B, and compares the ability of the alternatives to meet the plan purpose, as identified in the *Purpose and Need* and reiterated below. As shown in the table, Alternative B meets the purposes, while Alternative A does not address all the purposes.

The purpose of the action is to protect and manage acoustic resources and the acoustic environment in Minute Man NHP and to:

- Protect the acoustic experience of park visitors and ensure that cultural and natural sounds continue to play an important role in the enjoyment of park resources and values.
- Protect acoustic conditions for wildlife and the role of the acoustic environment in ensuring healthy and dynamic ecosystems.
- Provide an approach to protect and manage the acoustic environment that is consistent with National Park Service policy.

Table 8: Summary of Alternatives and How Each Meets Purpose

Plan Purpose	Alternative A: No Action	Alternative B: Preferred Alternative
	Meets Plan Purpose?	
Protect the acoustic experience of park visitors and ensure that appropriate cultural and natural sounds continue to play an important role in the enjoyment of park resources and values.	While implementation of actions identified in the GMP and Foundation Document has helped mitigate the adverse effects of noise on visitor experience, it does not establish acoustic standards or provide a strategy for monitoring the success of failure of such mitigation. Alternative A only partially meets this objective.	The acoustic experience for visitors would be protected under the preferred alternative. Visitors would have opportunities to experience natural and cultural sounds in both the Historic/Commemorative and Development zones. The management actions identified in this alternative provide ways to mitigate effects of noise. The indicators and standards and monitoring strategy outline a mechanism to determine if objectives are being met and if the acoustic environment is being protected. The preferred alternative fully meets this objective.
Protect acoustic conditions for wildlife and the role of the acoustic environment in ensuring healthy and dynamic ecosystems in the park.	The actions identified in the GMP and Foundation Document have minimally mitigated the adverse effects of human-caused sound on wildlife. The plan does not establish acoustic standards or provide specific management strategies to protect wildlife from human-caused noise. As wildlife are exposed to increasing human-caused noise, the park could experience a decline in populations due to their decrease ability to escape prey, find food and mates, and rear and protect young. Alternative A only minimally meets this objective.	The preferred alternative identifies acoustic objectives, standards and implementation measures to monitor and protect acoustic conditions. Wildlife would be exposed to reduced levels of noise and have greater opportunities to experience important sounds related to communication, predator prey relationships, mate selection, territory establishment and other functions. The preferred alternative fully meets the objective.
Provide an approach to protect and manage the acoustic environment that is consistent with NPS policy.	Alternative A does not provide an approach to managing or protecting the acoustic environment of the park. Alternative A does not meet this objective.	The preferred alternative identifies acoustic objectives, standards and implementation measures to monitor and protect acoustic conditions consistent with NPS policy. The preferred alternative fully meets the objective.

Table 9 summarizes the anticipated environmental impacts for each alternative. Only those impact topics that have been carried forward for further analysis are included in this table. The *Environmental Consequences* section provides a more detailed explanation of these impacts.

Table 9: Environmental Impact Summary by Alternative

Impact Topic	Alternative A: No Action	Alternative B: Preferred Alternative
Acoustic Environment/ Soundscape	Effects to the soundscape and acoustic environment could go unnoticed until impacts to other resources were detected such as changes in wildlife distributions or increases in the number of visitor complaints about noise. Similarly, the effectiveness of management actions to protect the acoustic resource could not be determined without clearly articulated acoustic objectives and standards and a systematic monitoring program. Therefore, Alternative A would result in moderate long-term adverse impacts to park acoustic environment.	Because there is variation in natural ambient levels and acoustic conditions throughout the park, the intensity of the beneficial impact would vary. In areas where existing noise levels are higher the effect would be greater. In areas with lower natural ambient levels and fewer noise events, the intensity of beneficial impacts would be less. Overall, implementing the plan would result in long-term moderate beneficial effects to the acoustic resources.
Visitor Use & Experience	Visitors could be exposed to increased levels of human-caused noise, which would decrease their opportunities to experience natural and cultural sounds. Overall, changes in acoustic conditions would move the resource away from the desired condition leading to long-term, minor to moderate adverse impacts to visitor experience.	Because there is variation in natural ambient levels and acoustic conditions throughout the park, the intensity of the beneficial impacts would vary. In areas where existing noise levels are higher, the effect would be greater. In areas with lower natural ambient levels and fewer noise events, the intensity of beneficial impacts would be less. Overall, changes in acoustic conditions would move the resource toward a desired condition and help achieve acoustic objectives leading to long-term, moderate beneficial impacts to visitor experience.
Park Operations	Under Alternative A, the NPS would continue current approaches to park operations. Park staff would continue to use existing motorized equipment and power tools. The number of staff required to complete maintenance tasks and resource management tasks would not change. As a result, Alternative A would have negligible impact on park operations.	Management actions identified in the preferred alternative could affect park operations. Implementing the preferred alternative would have beneficial effects on park operations by minimizing staff exposure to noise. Overall, the effects of implementing Alternative B would result in minor short-term adverse impacts to park operations however benefits to acoustic resources, visitor experience, and wildlife from reduced noise levels would help to offset any adverse impacts to park operations.

Impact Topic	Alternative A: No Action	Alternative B: Preferred Alternative
Wildlife, Threatened, Endangered Animal Species & Animal Species of Concern	Under the no-action alternative wildlife would be exposed to increasing levels of noise, which could interfere with the natural sounds they need for communication, predator prey relationships, mate selection, territory establishment and other functions. Overall, changes in acoustic conditions would move the acoustic resource away from the desired condition leading to long-term, moderate adverse impacts to wildlife.	Under the preferred alternative the NPS would adopt acoustic objectives and standards and implement measures to monitor and protect acoustic conditions. Wildlife would be exposed to reduced levels of noise and have greater opportunities to experience important sounds related to communication, predator prey relationships, mate selection, territory establishment and other functions. Overall, changes in acoustic conditions would move the acoustic resource toward the desired condition leading to long-term, moderate beneficial impacts to wildlife.
Cultural Landscapes	Under the no-action alternative the NPS would continue current approaches to park maintenance of cultural landscapes. As a result, Alternative A would have negligible impacts on cultural landscapes.	Implementing the preferred alternative would have beneficial effects on cultural landscapes by minimizing exposure to noise and creating a contemplative atmosphere where cultural sounds and culturally relevant natural sounds can be heard. The effects of implementing Alternative B would result in minor short-term adverse impacts to cultural landscapes as maintenance staff adjusted to less mechanized methods.
Historic Structures	Overall, changes in acoustic conditions would move the historic setting, feeling, and association resource away from the desired condition leading to long-term, moderate adverse impacts to historic structures.	Actions in this plan may affect equipment on or around historic structures and could have a potential effect on the feeling, setting, and association of the historic designation. Some noise reduction efforts such as installation of mufflers or noise barriers, installation of modern, quieter machinery (i.e. HVAC) could negatively affect historic structures. But, all actions will be in accordance with section 106 of the NHPA and will prevent adverse effects to historic structures. Implementation of the plan would have long-term beneficial effects to the overall feeling, setting and association of historic structures.

AFFECTED ENVIRONMENT

DESCRIPTION OF PARK

Minute Man National Historical Park (NHP) is located in Concord, Lexington, and Lincoln, MA. Containing 1,038 acres, the park preserves historic sites, structures, properties and landscapes associated with the opening battles of the American Revolution, which occurred April 19th, 1775. Public Law 86-321, passed by Congress in 1959, established Minute Man NHP to preserve and interpret properties related to the Battles of Lexington and Concord. This act was supplemented by Public Law 102-488 in 1992, which expanded the park boundary and reiterated the purpose of the park to include the preservation and interpretation of the American Literary Renaissance sites and the historic landscape along the Battle Road between Lexington and Concord.

Minute Man NHP has four geographic units (see Figure 1. Park Map).

Battle Road Unit - The Battle Road Unit, with 849 acres, encompasses the road that passes from Meriam's Corner in Concord through Lincoln to Fiske Hill in Lexington, along which local militias battled British regulars. Stretching about four miles along Massachusetts Avenue / North Great Road / Lexington Road / Route 2A, the Battle Road Unit has been rehabilitated in many places to reveal the landscape of 1775. The unit features the Minute Man Visitor Center and many historic buildings and sites, including Parker's Revenge, Fiske Hill, Captain William Smith House, Paul Revere Capture Site, Hartwell Tavern, Bloody Angle, and Meriam's Corner. Much of the Battle Road Trail has been returned to the width and material of the historic Battle Road. The trail traverses woodlands, wetlands, and agricultural farm fields.

North Bridge Unit - Located in Concord, the core of this unit is the North Bridge, which crosses the Concord River. The rebuilt structure commemorates the fighting between local militia and minute companies and British regulars on April 19, 1775. This unit also includes the North Bridge Visitor Center, Minute Man Statue, and Major John Buttrick House.

Wayside Unit - The Wayside, a National Historic Landmark dating from before the American Revolution, is located in Concord. In the 19th century, it became the home, sequentially, of educator Bronson Alcott, writers Louisa May Alcott and Nathaniel Hawthorne, and children's author Margaret Sidney. This unit celebrates Concord's rich literary tradition and the development of a uniquely American literature.

Barrett's Farm Unit - Barrett's Farm was the home of Colonel James Barrett, who commanded the Middlesex Militia in 1775 and was responsible for stockpiles of arms and supplies for the colonial militia. Colonel used his farm as a storage depot. British troops were seeking these arms on April 19, 1775, precipitating the Battles of Lexington and Concord and the Revolutionary War.

Minute Man NHP is located approximately 16 miles northwest of Boston, MA. The region surrounding the park has developed from a semi-rural area to mature suburbs and experiences continual growth pressures. Growth from residential, commercial, and industrial development has increased impacts from traffic, noise, and density in and around the park. The park attracts more than one million visitors each year.

ACOUSTIC ENVIRONMENT AND SOUNDSCAPES

In 2006, the Natural Sounds Program of the Natural Sounds and Night Skies Division of the NPS received a technical assistance request to collect baseline acoustical data at Minute Man National Historical Park (MIMA). During the winter (December 2008 – February 2009) and summer (July - September 2009) two sites were deployed per season for approximately 30 days each.

Monitoring Sites

Two monitoring sites were selected in Minute Man National Historical Park. One is located at Hartwell Tavern and the other is at Historic Farming Field. Information about the sites is in Table 10. A location map of the sites is shown in Figure 6. Acoustic Monitoring Sites.

Table 10: Acoustic Monitoring Sites

Site	Site Name	Vegetation	Elevation (m)	Latitude	Longitude
MIMA005	Hartwell Tavern	Deciduous Forest	84	42.45445	-071.29340
MIMA006	Historic Farming Field	Deciduous Forest/open Grassland	41	42.46088	-071.31289

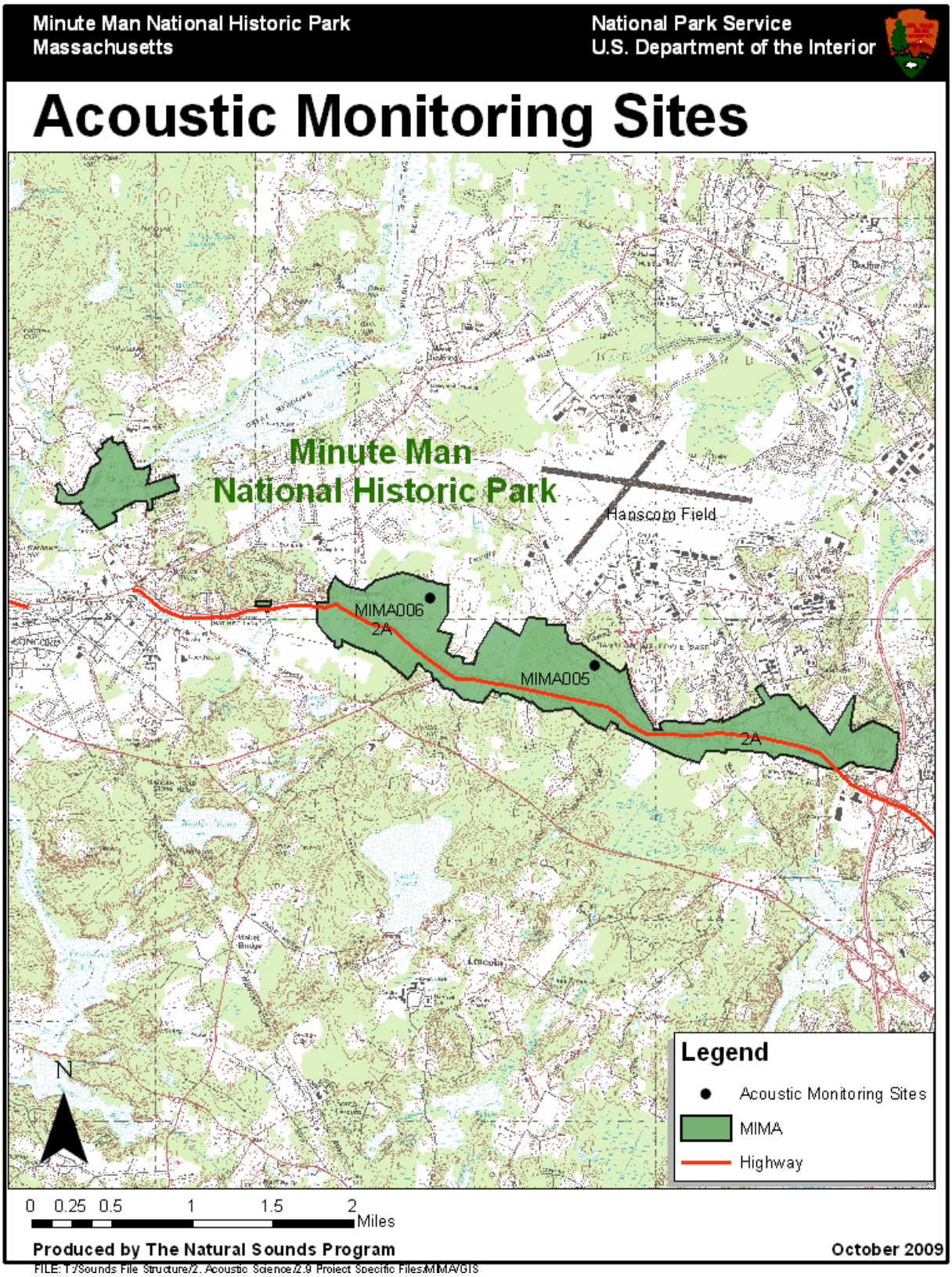

Figure 6. Acoustic Monitoring Sites

Acoustic Monitoring

It is important to understand existing conditions when characterizing the acoustic environment and assessing impacts to acoustic resources. The NPS calculates the existing ambient and natural ambient for acoustic studies. The existing ambient (L_{50}) is the median sound level recorded at a site and includes sound energy from all natural and anthropogenic or human-caused sources. The natural ambient (L_{nat}) is an estimate of what the median ambient level for a site would be if all anthropogenic sources were removed. Because conditions vary based on time of day, existing and natural ambient are calculated for both day and night.

The median natural ambient sound pressure levels (L_{nat}) and median existing ambient sound pressure level (L_{50}) for daytime hours and nighttime hours can be seen in Table 11.

Table 11: Natural and Existing Ambient Sound Levels

	Daytime: 0700 to 1900		Nighttime: 1900 to 0700	
Site	L_{nat}	L_{50}	L_{nat}	L_{50}
MIMA005 Hartwell Tavern (winter)	38.30	41.00	32.40	34.60
MIMA006 Historic Farming Field (winter)	36.20	40.80	29.30	33.20
MIMA005 Hartwell Tavern (summer)	39.20	42.20	38.80	42.10
MIMA006 Historic Farming Field (summer)	45.70	48.70	41.20	43.80

As expected, at both sites, ambient sound levels are generally lower during night time hours and winter levels are lower than summer.

In determining the current conditions of an acoustic environment, it is important to examine how often sound pressure levels exceed certain values.

Table 12 reports the percent of time that measured levels were above four key values. These exceedence values were calculated from the existing sound pressure levels (SPL) during the full duration of data collection, and include intrinsic (natural sound) and extrinsic (human-caused) sound sources.

The first threshold, 35 dBA, is designed to address the health effects of sleep interruption. Recent studies suggest that sound events as low as 35 dBA can cause increases in blood pressure and heart rate while sleeping (Haralabidis et al., 2008). The second threshold addresses the World Health Organization's (WHO) recommendations that noise levels inside bedrooms remain below 45 dBA (Berglund et al., 1999). The third threshold, 52 dBA, is based on the EPA's speech interference threshold for speaking in a raised voice to an audience at 10-meters. This threshold addresses the effects of sound on interpretive presentations in parks. The final threshold, 60 dBA, provides a basis for estimating impacts on normal voice communications at 2-meters. Hikers and visitors viewing historic landscapes in the park would likely be conducting such conversations.

Table 12. Percent time above metrics

Site Location	% Time above sound level: daytime, 0700 to 1900				% Time above sound level: nighttime, 1900 to 0700			
	35 dBA	45 dBA	52 dBA	60 dBA	35 dBA	45 dBA	52 dBA	60 dBA
MIMA005 Hartwell Tavern (Winter)	97.49	22.81	3.99	0.53	44.01	3.60	0.54	0.07
MIMA006 Historic Farming Field (Winter)	94.72	23.18	6.27	1.17	43.91	3.94	0.86	0.15
MIMA005 Hartwell Tavern (Summer)	99.83	29.7	5.99	0.81	99.56	41.88	10.80	0.19
MIMA006 Historic Farming Field (Summer)	100.00	86.71	30.18	2.09	98.07	34.59	13.11	0.32

At the Historic Farming Field site, sound levels in the summer season exceeded 52 dBA more than 30 percent of time – an average of nearly 20 minutes per hour. During the times when levels exceed 52 dBA, visitors could experience difficulty in hearing interpretive programs. At the Hartwell Tavern site sound levels exceeded 52dBA 6 percent of the day during the summer.

Audibility

Table 13 through Table 16 display the results of on-site listening sessions. Each audible sound source is listed in the first column. Percent time audible, or PA, is the second column. The third column, Max Event, reports the maximum event length among the sessions for each sound source. Likewise, the Mean Event column reports the mean length of events and the Count column reports the number of times that each sound source was audible. The last row in the table, noise free interval (NFI), describes the length of time between extrinsic or human-caused events when only natural sounds were audible. These on-site listening tables are essentially a sound inventory of each site. They reveal the sounds one is likely to hear at or near this location.

During the monitoring period detailed in this report, Natural Sounds Program staff conducted on-site listening to serve as a reference for office listening. Two sessions were conducted during the summer (one each at the two sites). The results of these sessions are presented in Table 13 and Table 14. In previous years numerous on-site listening sessions were conducted at MIMA by park staff and volunteers; the results from these sessions are provided in Table 15 and Table 16.

Table 13. Summary of on-site audible sound sources for MIMA005 Summer (Hartwell Tavern) n=1.

Sound Source	PA	Max Event	Mean Event	Min Event	SD Event	Count
Jet	9	1:37	0:45	0:12	0:28	7
Aircraft, Propeller	51	5:23	1:54	0:00	1:23	16
Vehicle	69	27:24	6:55	0:06	10:16	6
Motorcycle	0	0:07	0:07	0:07		1
Grounds Care	19	11:34	11:34	11:34		1
People, Voices	5	2:30	1:03	0:07	1:16	3
Wind	3	0:58	0:48	0:38	0:14	2
Bird	95	27:29	11:26	0:53	9:48	5
Insect	6	1:55	0:09	0:01	0:25	24
All Aircraft	56.7					
All Road Vehicles	69.2					
All Non-natural Sources	99.9					
All Natural Sources	97					
Noise Free Interval	0.1	0:02	0:02	0:02		1

Table 14. Summary of on-site audible sound sources for MIMA006 Summer (Historic Farming Field) n=1.

Sound Source	PA	Max Event	Mean Event	Min Event	SD Event	Count
Jet	15	2:36	1:07	0:18	0:45	8
Aircraft, Propeller	41	4:04	2:13	0:44	1:10	11
Helicopter	6	3:44	3:44	3:44		1
Vehicle	92	14:16	7:55	3:00	4:12	7
Siren	0	0:10	0:10	0:10		1
Lawnmower	5	2:07	1:05	0:09	0:59	3
Dumpster / Trashcan	0	0:03	0:03	0:03		1
People, Voices	8	1:19	0:38	0:06	0:25	8
People, Walking	2	0:37	0:30	0:23	0:10	2
Bicycling	5	0:38	0:29	0:14	0:10	6
Wind	91	15:36	9:08	1:53	5:48	6
Bird	96	28:35	14:21	1:33	12:48	4
Insect	7	1:17	0:26	0:01	0:25	10
All Aircraft	56.7					
All Road Vehicles	92.4					
All Non-natural Sources	99.9					
All Natural Sources	99.9					
Noise Free Interval	0.1	0:05	0:05	0:05		1

Between December 2006 and September 2007 numerous 15 minute on-site listening sessions were conducted at North Bridge and Hartwell Tavern. These data were collected by park staff and volunteers using PDAs provided by the Natural Sounds Program.

Table 15. Hartwell Tavern on-site listening. n=40

Sound Source	PA	Max Event	Mean Event	Min Event	SD Event	Count
Aircraft	2.00	2:41	0:46	0:04	0:43	15
Jet	21.00	9:39	0:56	0:04	1:06	127
Aircraft, Propeller	53.00	14:59	1:59	0:02	2:08	151
Helicopter	1.00	2:25	0:39	0:01	0:37	12
Vehicle	50.00	14:59	2:44	0:03	3:42	104
Motorcycle	0.00	0:25	0:24	0:24	0:01	2
Grounds Care	2.00	6:30	1:59	0:05	2:27	7
People	31.00	15:00	1:24	0:02	2:41	128
People, Walking	0.00	0:18	0:12	0:07	0:08	2
Gunshot	0.00	0:03	0:02	0:02	0:01	2
Domestic Animal	0.00	0:24	0:11	0:03	0:07	10
Construction	0.00	0:26	0:10	0:03	0:08	7
Non-natural Unknown	0.00	1:06	0:29	0:06	0:25	5
Wind	26.00	14:06	1:53	0:02	2:45	80
Water	8.00	14:55	5:04	0:07	7:13	9
Chipmunk	3.00	5:39	1:54	0:02	2:17	9
Bird	70.00	15:00	2:50	0:01	3:58	141
Insect	28.00	15:00	8:25	0:08	5:41	19
Animal (Natural)	0.00	0:12	0:12	0:12	0:00	1
All Aircraft	69.70					
All Road Vehicles	50.50					
All Non-natural Sources	94.70					
All Natural Sources	89.80					
Noise Free Interval	5.30	6:00	1:40	1:00	1:22	18

Table 16. North Bridge on-site listening. n=38

Sound Source	PA	Max Event	Mean Event	Min Event	SD Event	Count
Aircraft	1.00	3:28	1:28	0:10	1:45	3
Jet	20.00	5:18	1:02	0:06	0:43	117
Aircraft, Propeller	30.00	12:31	1:26	0:03	1:44	124
Helicopter	1.00	2:25	1:54	1:04	0:44	3
Vehicle	79.00	15:00	2:47	0:03	3:38	171
Motorcycle	1.00	1:04	0:33	0:14	0:15	7
Heavy Equipment	1.00	2:43	1:27	0:14	1:15	3
Grounds Care	3.00	3:07	1:09	0:05	0:52	16
Lawnmower	2.00	3:01	0:48	0:09	0:49	12
Leaf Blower	2.00	8:40	3:55	1:14	4:07	3
People	39.00	14:09	1:16	0:01	2:13	184
People, Walking	2.00	1:21	0:29	0:06	0:19	30
Domestic Animal	1.00	3:25	1:14	0:08	1:12	6
Horse	0.00	0:08	0:08	0:08	0:00	1
Bldg, Utilities (HVAC, Alarms)	1.00	1:46	1:08	0:23	0:36	4
Construction	3.00	14:15	2:12	0:05	4:54	8
Non-natural Unknown	1.00	0:59	0:24	0:02	0:25	8
Wind	42.00	15:00	3:48	0:06	4:43	67
Squirrel	0.00	0:04	0:04	0:04	0:00	1
Chipmunk	1.00	2:56	0:46	0:05	0:58	8
Bird	65.00	15:03	3:26	0:02	5:08	114
Insect	12.00	14:58	6:54	0:11	6:20	10
All Aircraft	48.70					
All Road Vehicles	79.50					
All Non-natural Sources	94.70					
All Natural Sources	84.00					
Noise Free Interval	5.30	15:00	2:17	0:59	3:41	14

Modeling

Using acoustic data collected at 244 park sites across the nation and 109 spatial explanatory layers (such as location, landcover, hydrology, wind speed, and proximity to noise sources such as roads, railroads, and airports), NSNSD has developed a geospatial sound model that predicts natural and existing sound levels (for an average summer day) with 270 meter resolution (Mennitt et al. 2013). This model offers insight into how acoustic conditions vary across the park. While the existing sound level metric reports current conditions (including anthropogenic and natural sound sources), the natural ambient sound level metric reports what conditions would be without human influence. In addition to predicting these two ambient sound levels, the model also calculates the difference between the two metrics, providing a measure of impact to the natural acoustic environment from anthropogenic sources. The resulting metric (L_{50} dBA impact) indicates how much anthropogenic noise raises the existing sound pressure levels in a given location. Modeling results for all three metrics at MIMA are presented in tabular (Table 17) and map form below (Figure 7, Figure 8 & Figure 9).

Table 17. Modeled existing ambient sound level, natural ambient sound level, and impact levels (in A-weighted decibels, dBA) at MIMA

Park Code	Sound level metric	Minimum (dBA)	1st Quartile (dBA)	Mean (dBA)	3rd Quartile (dBA)	Maximum (dBA)
MIMA	Existing	42.7	44.0	45.2	45.9	48.9
MIMA	Natural	32.9	34.4	34.5	34.7	36.5
MIMA	Impact	8.1	9.4	10.6	11.5	14.68

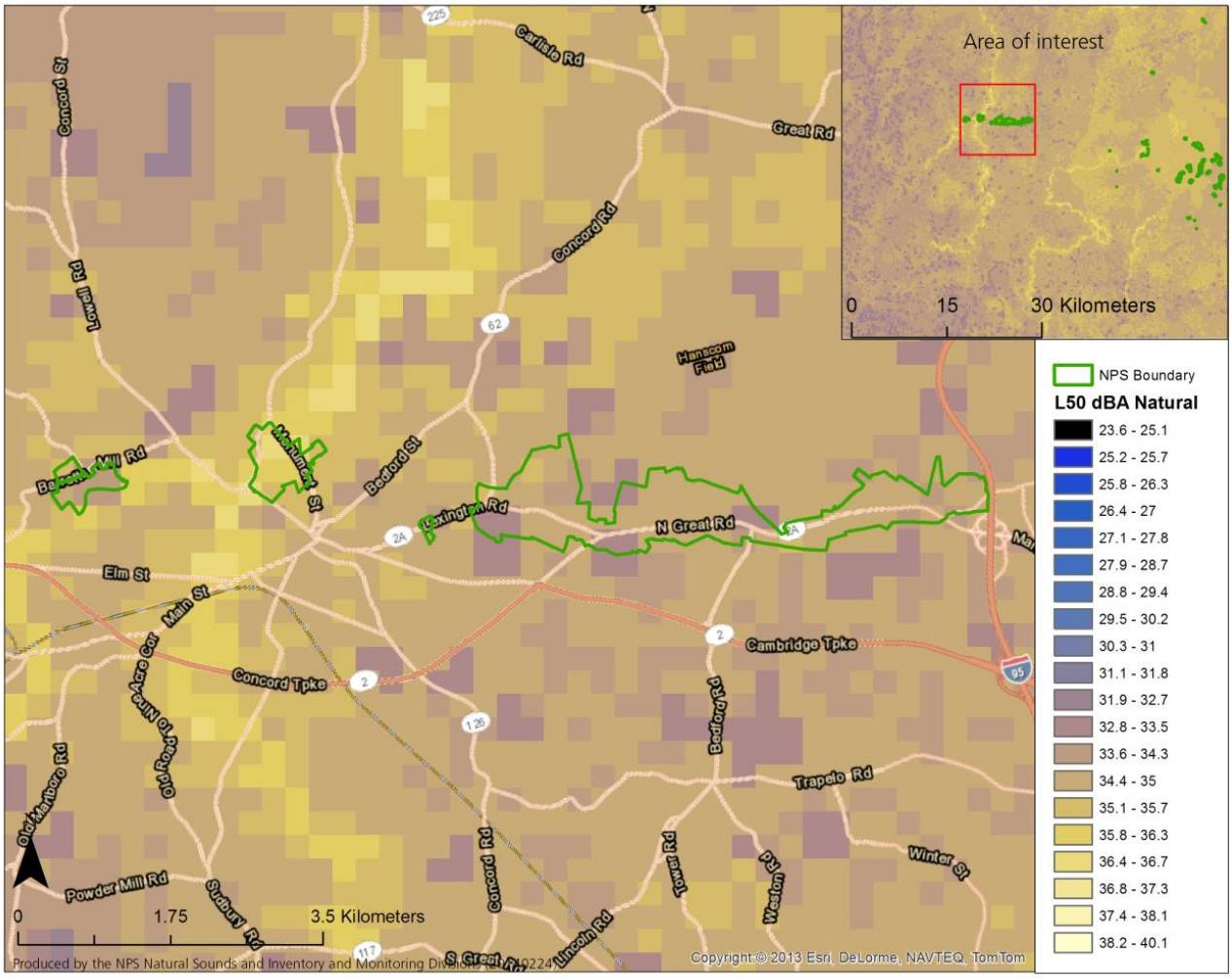

Figure 7. L50 dBA natural ambient map for MIMA, as generated by ver. 2.31 of geospatial model

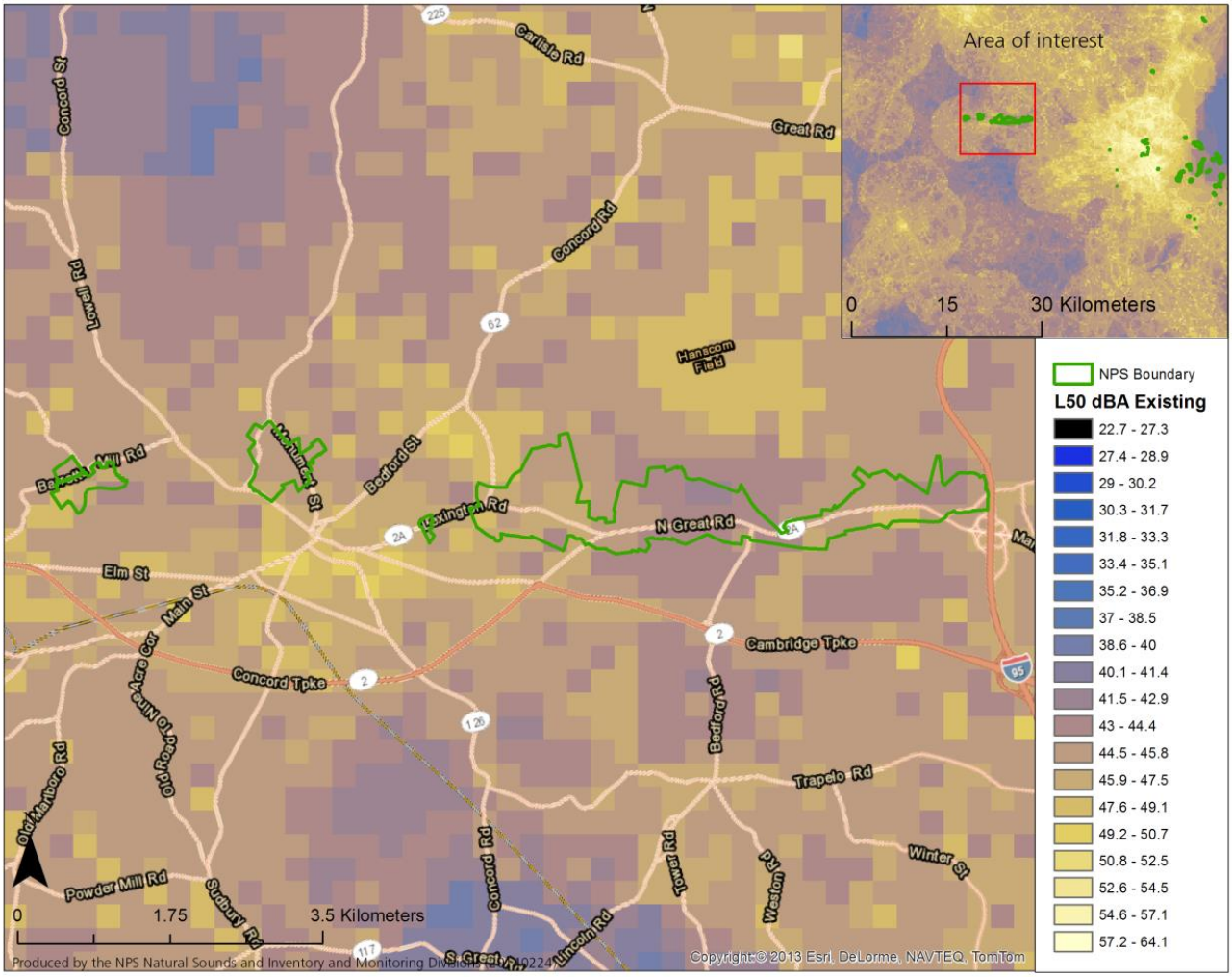

Figure 8. L50 dBA existing ambient map for MIMA, as generated by ver. 2.31 of geospatial model

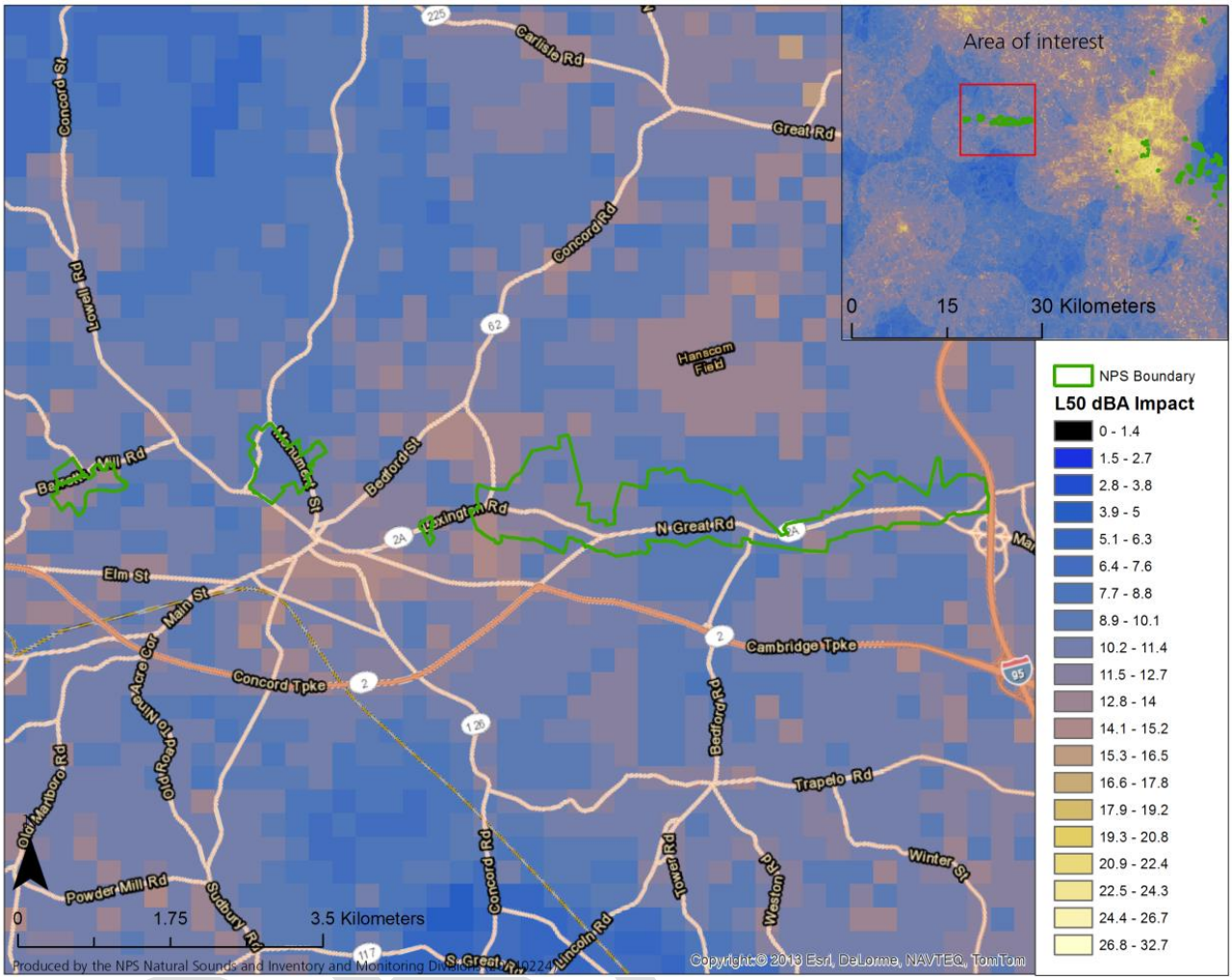

Figure 9. L50 dBA impact map for MIMA, as generated by ver. 2.31 of geospatial model

VISITOR USE AND EXPERIENCE

During the summer of 2007, Minute Man NHP worked with the University of Idaho to complete a visitor survey at the park to understand visitation patterns, as well as visitor understanding and satisfaction. From 2007-2012, Minute Man NHP averaged 1.1 million visitors per year. Popular visitor activities at the Battle Road Unit include learning about history, hiking on trails, seeing the Minute Man Visitor Center theater program, shopping at the Minute Man Visitor Center, and ranger talks (Le et al., 2008). Issues brought up by visitors include confusing wayfinding and noise and disruption from Route 2A.

Once at the Minute Man Visitor Center, guests are oriented to the site through the theater program and mural of the unit. Park Rangers are also on hand to answer questions and help visitors plan their visits. From the Minute Man Visitor Center, guests can travel the Battle Road Trail on foot, bicycle, or wheelchair. The most visited sites in the unit include the Battle Road Trail, Hartwell Tavern, Paul Revere Capture Site, Meriam's Corner, Bloody Angle, Parker's Revenge, Fiske Hill, and the Vernal Pool Trail. The wayside exhibits allow guests to note the historic significance of their current location and follow the progression of events that occurred on April 19, 1775. The sense of place is enhanced by restored portions of the cultural landscape that reflect the open agricultural fields and grazing livestock. As more of the cultural landscape is restored and interpreted in the NHP, visitors will have more opportunity to connect with the history of the site in more locations.

The park offers living history programs at Hartwell Tavern. These programs are presented daily from late May through October. With the help of its partners and volunteers, the park also puts on living history special events. The park conducts educational programs for school groups, serving 15,000 students per year. Along with the historical perspective, the unit offers an escape from the surrounding developed landscape. This escape, however, is dependent on the visitor's proximity to Route 2A. Vehicles reach high speeds traveling along the road, creating noise and sound intrusions into the landscape. Hanscom Field creates additional noise intrusions from over-flights and vehicular traffic to and from the site. Route 2A divides the park, forcing many of the visitors and park programs to remain on the northern side of the road. Visitors reported the noise and speed of cars on Route 2A was the greatest impact on their experience at the park (Le et al., 2008).

PARK OPERATIONS

Minute Man NHP is organized into four divisions to operate the four units of the park: North Bridge, Wayside, and Battle Road. There are 29 full-time equivalent (FTE) staff positions, although some of them remain vacant from time to time. (In calculating FTE, seasonal employees' time is added together to make up the number of equivalent full-time positions.) The Interpretation and Education division operates two visitor centers and five historic houses, and presents a variety of programs and special events (in partnership with park volunteers, including historical re-enactors). In 2011, 190,814 park visitors were served at visitor centers, 41,769 visitors attended formal programs and demonstrations, 14,994 school students attended education programs, and there were 65 special events attended by 26,684 visitors. This division currently has employees equal to 12.5 FTE. This includes FTE for the curator and museum technician, who preserve and protect park natural and cultural resource collections and make the collections available for research, exhibits, and interpretive programs. The curator also ensures that all park projects are reviewed for compliance with the National Historic Preservation Act (NHPA).

Resource and Visitor Protection works to keep park visitors safe and to protect resources. Law enforcement patrols serve to calm traffic on park roads and increase visitor safety and security. Intrusion and fire alarms are maintained to protect historic structures. This division currently has 4.5 FTE. The park

works in consultation with a regional office natural resource manager and with the Northeast Temperate Network to monitor and protect natural resources and restore native habitats.

The Maintenance and Facility Management division works to maintain the park's 1,038 acres of grounds, cultural landscapes, trails, parking lots, roads and structures. Coordination with regional office architects and oversight of contractors accomplishes major rehabilitation projects. The division totals 10.5 FTE.

Park Management and Administration functions total 6.3 FTE. This includes the superintendent and park planner/public affairs specialist, and the administration functions of budget planning and tracking, human resources, concessions and leasing, contracting, travel and training, information technology, partnerships and cooperative agreements.

WILDLIFE, THREATENED AND ENDANGERED ANIMAL SPECIES AND ANIMAL SPECIES OF CONCERN

Mammals

Despite its location in an urban/suburban region, the park supports a surprising number and diversity of wildlife. In doing so, the park serves as an island of biodiversity in the developing region. The most recent survey of mammals within the park identified many different species. During the winter, raccoon (Procyon lotor) are the most frequently detected medium-sized species, followed closely by fisher (Martes pennanti) and red fox (Vulpes vulpes). During the summer months, Virginia opossum (Didelphis virginiana) and raccoon are the most often detected and widely distributed species. Many of these species are found in a wide variety of habitats, allowing them to utilize the forests and meadows contained within the park. The frequency with which the fisher was detected was surprising given the urban/suburban environment. Unlike the raccoon and red fox, the fisher is known to reside only in continuous forests. The presence of this species throughout the park suggests that it has successfully adapted to the continually developing region. The most commonly detected small mammal found in the park was the white mouse (Peromyscus leucopus). Short-tailed shrew (Blarina brevicauda) and meadow vole (Microtus pennsylvanicus) were also frequently detected. Short-tailed shrews were found to have adapted to nearly all habitat types within the park, while meadow voles were found only in fields and wetlands. In ranking order, the most diverse habitats in the park were the mixed forests, fields, and deciduous forests. Some of the highest levels of diversity were attributed to their proximity to creeks or other habitat corridors.

Birds

In a 2009 Natural Resource Assessment, a total of 59 bird species were identified throughout Minute Man NHP (NPS, 2009b). The ten most abundant species include the blue jay (Cyanocitta cristata), American Crow (Corvus brachyrhynchos), black-capped chickadee (Poecile atricapillus), eastern tufted titmouse (Baeolophus bicolor), white-breasted nuthatch (Sitta carolinensis), common yellowthroat (Geothlypis trichas), song sparrow (Melospiza melodia), northern cardinal (Cardinalis cardinalis), red-winged blackbird (Agelaius phoeniceus), and American goldfinch (Carduelis tristis).

Reptiles and Amphibians

Reptile and amphibian populations are limited throughout the park. Three species of turtle have been observed in the park: the painted turtle (Chrysemys picta), eastern snapping turtle (Chelydra serpentina serpentine), and stinkpot turtle (Sternotherus odoratus). Populations of these three species are very small and are isolated to small ponded areas and wetlands. The lack of larger populations is due to the absence of necessary habitat and/or the barriers that restrict movement (Route 2A) (Windmiller & Walton, 1992). Five species of snakes have been observed within the park. These species include the gartersnake (Thamnophis sirtalis tetrataenia), milksnake (Lampropeltis triangulum), northern watersnake (Nerodia sipedon), ribbon snake (Thamnophis sauritus sauritus), and black racer (Coluber constrictor constrictor). Although these five species were identified within the park, they exist in very small numbers within the

park. The garter snake was the only snake observed repeatedly. The absence of larger snake populations is most likely due to the patchy habitat and need to cross roads (Windmiller & Walton, 1992). Four species of salamander are known to exist with the park: the spotted salamander (Ambystoma maculatum), the northern two-lined salamander (Eurycea bislineata), the red-backed salamander (Plethodon cinereus), and the red-spotted newt (Notophthalmus viridescens viridescens). These species are confined to the vernal pools scattered throughout the park. Their number and health are directly related to the condition of the vernal pools. During dry periods, the numbers of salamanders decreases. In wet periods, the numbers may increase and more species may exist in the park (Thompson & Jenkins, 1992).

Butterflies

A survey of butterflies within the park identified different species. These species included a total of 43 individuals that inhabited a variety of habitats throughout the park. Based on the species identified, the butterfly population at the park represents a fairly diverse population. Of those identified, the frosted elfin (Callophrys irus) is a concern. The species is confined to the eastern portion of the state, with only known individuals identified in a five-year time frame.

Special Status Animal Species

Two species, the frosted elfin (Callophrys irus) and the Blanding's turtle (Emydoidea blandingii) have been observed in Minute Man (Windmiller & Walton, 1992; Cook et al., 2011).

CULTURAL LANDSCAPE

The essential elements of the historic landscape—the fields, stone walls, structures, orchards, sounds, and roads—can be experienced by visitors. They create a "sense of place" that is essential to the experience of the park and an understanding of its significance. The Battle Road Trail includes parts of the historic Battle Road that have been returned to the original width and approximate materials. The trail traverses woodlands, wetlands, and agricultural farm fields. It encompasses the road that passes from Meriam's Corner in Concord through Lincoln and the Paul Revere Capture Site and Parker's Revenge to Fiske Hill in Lexington. Along this route local militias battled British regulars on April 19, 1775. The Battle Road Trail is a major amenity of the park and the area's communities. It receives heavy use from pedestrians and cyclists. Culturally and historically appropriate sounds that contribute to the historic sense of place include 1) marching, music, calls, and gunfire from battle reenactments, 2) human activity like walking and interpretive programs along the Battle Road Trail, 3) farm animal calls and agricultural equipment from the farmland, 4) creaking and a quiet atmosphere at historic building sites, 5) natural sounds such as wind, rain, leaves rustling, running water, and animal calls.

The cultural landscape has undergone great change in the past few decades. Much land has been cleared to reveal the historic appearance of the landscape. Research in areas such as archeology and landscape change has revealed more information about park resources that can be used to inform management. Route 2A through the park was designated as the Battle Road Scenic Byway in 2006 and a corridor management plan was completed in 2011.

HISTORIC STRUCTURES

Minute Man NHP contains 43 historic buildings listed on the National Register. The historic structures are an important part of the historic scene and the visitor experience at Minute Man NHP. The 11 "witness structures"—buildings that were standing in 1775—are of the highest importance, and 32 later historic buildings, which date from just after the Revolutionary War to the early 20th century, add to the historic scene. Other important historic structures include the park's system of stone walls and four historic markers that date from as early as 1885. They mark Meriam's Corner, the Paul Revere Capture Site, The Bluff, and the Hayward Well in the Battle Road Unit. The Wayside Unit celebrates Concord's rich literary tradition, including The Wayside House and Barn. According to assessment in 2009 of the

"witness structures," which are on the List of Classified Structures, most structures are in good while some are in fair condition. There are 20 non-historic, mid-to-late-20th-century buildings in the Battle Road Unit. In recent years, a number of the historic buildings have been rehabilitated and several of the rehabilitated historic buildings are underused or vacant.

ENVIRONMENTAL CONSEQUENCES

This section describes the potential environmental consequences that would occur as a result of implementing each of the alternatives. Topics analyzed in this section include: acoustic environment/soundscapes, visitor use and experience, park operations, wildlife, cultural landscapes, historic structures. Direct, indirect, and cumulative effects are analyzed for each impact topic carried forward. Potential impacts are described in terms of type, context, duration, and intensity. General definitions are defined as follows, while more specific impact thresholds are given for acoustic environment/soundscapes, visitor use and experience, park operations, wildlife, cultural landscape, and historic structures later in this section.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
    - Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource towards a desired condition.
    - Adverse: A change that moves the resources away from a desired condition or detracts from its appearance or condition.
    - Direct: An effect that is caused by an action and occurs in the same time and place. All impacts identified in this document are "direct" unless otherwise stated.
    - Indirect: An effect that is caused by an action but is later in time and farther removed in distance, but is still reasonably foreseeable.
- **Context** describes the area or location in which the impact will occur; site-specific, local, regional, or even broader.
- **Duration** describes the length of time an effect will occur, either short-term or long-term. Because definitions of duration can differ by topic, definitions are provided separately for each impact topic.
- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized as negligible, minor, moderate, and major. Because definitions of intensity vary by topic, intensity definitions are provided separately for each impact topic.

CUMULATIVE IMPACT SCENARIO

The CEQ regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and preferred alternatives.

Cumulative impacts were determined by combining the impacts of the alternatives with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing or reasonably foreseeable future projects at Minute Man NHP. The geographic scope for this analysis includes actions within and adjacent to the park boundaries, while the temporal scope includes projects within a range of approximately ten years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis:

Development on lands bordering the park – The region surrounding the park has developed from a semi-rural area to mature suburbs. Continual growth pressures and impacts from traffic, noise, and density in and around the park are important concerns. For the purposes of the cumulative analysis for this EA, it is assumed that the rate of development of land near Minute Man NHP would increase. This demand is fueled by growth from residential, commercial, and industrial development.

There is pressure from nearby development and expansion of Massport operations at Hanscom Field to improve roads in the park and to divert more traffic through the park. Massport is a public authority that operates airports and seaports in the region.

Exotic plant monitoring and control -- The extent of invasive plants in Minute Man NHP is rated a "significant concern." Twenty-five species are identified that are considered invasive or potentially invasive by the Massachusetts Invasive Plants Advisory Group. The park works to remove and control invasive plants. Some removal actions could increase the overall existing sound levels.

Planned Road Work – There is pressure from nearby development to improve roads in the park and to divert more traffic through the park. There are some theoretical scenarios projected by Massport that would realign and improve roads in the park. In addition, planned construction over the next five years of an elevated flyway at Crosby's Corner (junction of Route 2A and Route 2) will greatly increase through-traffic in the park.

ACOUSTIC ENVIRONMENT AND SOUNDSCAPES

NPS *Management Policies 2006* identify soundscapes as a resource with inherent value like air, water, and wildlife. Analyses of proposed actions must consider the effects of the action on the acoustic environment in a park without regard to how they are perceived by humans and wildlife.

Thresholds for identifying impacts to the acoustic environment and soundscape are defined as follows:

Table 18: Acoustic resources, Impact Intensity

Acoustic Environment and Soundscapes	
Impact Intensity	Intensity Definition
Negligible	The action would rarely cause a change in existing ambient sound conditions, and/or there would be little or no change in periods of time between noise events. The amount of time that noise is audible would change very little from existing conditions. The action would rarely result in a change to any noise metric that is more than a very small increment from existing levels in the same area.
Minor	The action would occasionally cause a change in existing ambient sound conditions, and/or there would a small change in periods of time between noise events. The amount of time that noise is audible would change a small amount from existing conditions. The action would occasionally result in a change to any noise metric that is more than a small increment from existing levels in the same area.
Moderate	The action would cause a change in existing ambient sound conditions for an intermediate amount of the day, and/or there would an intermediate change in periods of time between noise events. The amount of time that noise is audible would change an intermediate amount from existing conditions. The action would occasionally result in a value for a noise metric that is an intermediate increment from existing levels in the same area.
Major	The action would cause a change in existing ambient sound conditions for a large amount of the day, and/or there would be more than an intermediate change in periods of time between noise events. The amount of time that noise is audible would change more than an intermediate amount from existing conditions. The action would occasionally result in a value for any noise metric that is more than an intermediate increment from existing levels in the same area.
Duration	Short-term – The impact would generally last the life of the project or activity or up to one year.

	Long-term – The impact would last longer than one year.

Impacts of Alternative A – No Action
Under the no-action alternative the NPS would continue current approaches to protecting the acoustic environment. Acoustic objectives and standards would not be developed and an acoustic monitoring program would not be implemented. Continued development inside the park and adjacent to park boundaries could continue to affect the acoustic environment. Increases in visitor use, and vehicle access, modifications to park operations and other changes could affect acoustic resources but the park would not have specific acoustic objectives against which to measure potential effects or a systematic approach for monitoring changes to the acoustic resources.

Effects to the acoustic environment could go unnoticed until impacts to other resources were detected such as changes in wildlife distributions or increases in the number of visitor complaints about noise. Similarly, the effectiveness of management actions to protect the soundscape resource could not be determined without clearly articulated acoustic objectives and standards and a systematic monitoring program. Therefore, Alternative A would result in moderate long-term adverse impacts to park acoustic environment and soundscapes.

Impacts of Alternative B – Preferred Alternative
Implementation of Alternative B would help the park meet acoustic resource objectives. In areas where they are not currently being met, the standards would help identify locations that need management action to reduce noise levels. In areas where noise is increasing, the standards would identify the need for management action to ensure that conditions remain consistent with resource protection and management goals.

Because there is variation in natural ambient levels and acoustic conditions throughout the park, the intensity of the beneficial impact would vary. In areas where existing noise levels are higher the effect would be greater. In areas with lower natural ambient levels and fewer noise events, the intensity of beneficial impacts would be less. Overall, implementing the plan would result in long-term moderate beneficial effects to the acoustic environment and soundscape resource.

Cumulative Impacts
Other past, present and planned future actions have the potential to affect the soundscape. Adverse impacts to the soundscape may result from increased visitation, increased traffic, overflights, roadwork, and nearby development. Increased vehicle traffic and visitor presence would potentially increase the ambient sound environment. Development on private lands bordering the park could permanently change acoustic conditions in the park and create minor to moderate, long-term adverse impacts

The moderate long-term beneficial impacts associated with the implementation of Alternative B however, would reduce the potential adverse impacts from actions described above. As a result, cumulative effects from implementation of Alternative B would be long-term, moderate, and beneficial effects to the acoustic environment and soundscape resource.

Conclusion
Alternative A would result in long-term moderate adverse impacts because the park would not have the means to address noise issues in a comprehensive and systematic manner. Alternative B would have long-term moderate beneficial effects to the acoustic environment and soundscape resource. The incremental effect of Alternative B on the effects of past, present and reasonably foreseeable future actions would be long-term, moderate and beneficial.

VISITOR USE AND EXPERIENCE

In surveys of national park visitors, more than 90 percent of respondents have identified hearing the sounds of nature as an important reason for visiting national parks (Haas & Wakefield, 1998). The acoustic environment has an important effect on the quality of park visitor experience. Research has indicated that visitors appreciate opportunities to hear the sounds of nature and consistently rate sounds such as streams, bird songs, and other natural sounds as pleasing. The same research also found that visitors consistently rate human-caused sounds such as vehicles, cell phones, and loud talking as annoying (Pilcher, et al., 2009).

This section addresses the effects on visitor experience. Thresholds for identifying impacts visitor use and experience are defined as follows in Table 19:

Table 19: Visitor Use and Experience, Impact Intensity

Visitor Use and Experience	
Impact Intensity	Intensity Definition
Negligible	Visitors would not be affected, or changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
Minor	Changes in visitor use and/or experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
Moderate	Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.
Major	Changes in visitor use and/or experience would be readily apparent and would have important consequences. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.
Duration	Short-term – The impact would generally last the life of the project or activity or up to one year.
	Long-term – The impact would last longer than one year.

Impacts of Alternative A – No Action

Under the no-action alternative the NPS would continue current approaches to protecting the acoustic environment. Acoustic objectives and standards would not be developed and an acoustic monitoring program would not be implemented.

Visitation is expected to continue to increase. More visitors to the park would bring additional vehicle traffic and would increase maintenance need for infrastructure used by visitors. Development on private lands near the park is expected to increase over time which could increase human-caused noise levels within park boundaries.

Because of this, the amount of time that human-caused sound could be heard by visitors would increase. Maximum and median noise free intervals would decrease, considerably in some areas. As a result opportunities for visitors to experience the sounds of nature would be diminished. Deviation from natural ambient would be the same as current levels in some areas. In other areas there would be a noticeable increase over time leading to a decrease in listening area and alerting distance. This means that visitors would have to be closer to birds and other natural sounds before hearing them. The amount of time that visitors would be exposed to noise levels that could interfere with speech among visitors and park staff involved in general conversations, interpretive programs would increase.

In general, visitors would be exposed to increased levels of human-caused noise, which would decrease their opportunities to experience natural and cultural sounds. Overall, changes in acoustic conditions would move the resource away from the desired condition leading to long-term, minor to moderate adverse impacts to visitor experience.

Impacts of Alternative B – Preferred Alternative
Implementation of Alternative B would help the park meet acoustic resource objectives which are designed in part to protect the soundscape and acoustic environment for current and future generations of park visitors. In areas where noise is increasing or acoustic objectives are not being met, the standards identified in Alternative B provide management actions needed to ensure that acoustic conditions are consistent with resource protection and management goals.

In most areas, the amount of time that noise could be heard would decrease due to a reduction in noise levels in the park. Maximum and median noise free intervals would increase. As a result, opportunities to experience the sounds of nature would increase for most visitors. Deviation from natural ambient would decrease over time leading to an increase listening area and alerting distance. This means that visitors would be able to hear birds and other natural sounds from a greater distance.

The amount of time that visitors would be exposed to noise levels that could interfere with speech would decrease. Visitors and park staff involved in general conversations and interpretive programs would be interrupted by noise less often. Visitors could experience minor inconvenience from possible management actions designed specifically to protect acoustic conditions such as limiting the use of generators and other electronic sound-emitting devices.

Because there is variation in natural ambient levels and acoustic conditions throughout the park, the intensity of the beneficial impacts would vary. In areas where existing noise levels are higher the effect would be greater. In areas with lower natural ambient levels and fewer noise events, the intensity of beneficial impacts would be less. Overall, changes in acoustic conditions would move the resource toward a desired condition and help achieve acoustic objectives leading to long-term, moderate beneficial impacts to visitor experience.

Cumulative Impacts
Other past, present and planned future actions have the potential to affect the visitor use and experience. Adverse impacts to visitor experience may result from increased visitation (increased vehicles) and park operations. Increased vehicle traffic and visitor presence would potentially increase the ambient sound environment. Planned road work could cause short-term adverse impacts to visitor experience from noise generated by construction equipment. Resource and facilities management activities could cause short-term adverse impacts through the increased use of power tools and other motorized equipment. These actions are likely to create short-term, minor to moderate adverse impacts on the acoustic environment of the park which would adversely affect visitor experience. Development on private lands bordering the park could permanently change acoustic conditions in the park and, in turn, create minor to moderate, long-term adverse impacts to visitor experience.

The moderate long-term beneficial impacts associated with the implementation of Alternative B would reduce the potential adverse impacts from actions described above. As a result, cumulative effects from implementation of Alternative B would be long-term, moderate, and beneficial impacts to visitor experience.

Conclusion
Alternative A would result in long-term minor to moderate adverse impacts to visitor experience because noise levels in the park could increase over time and the park would not have the means to address noise issues in a comprehensive and systematic manner. Alternative B would have long-term moderate beneficial effects to visitor experience because standards have been identified to protect visitors from impacts of noise. Alternative B also identifies a mechanism to monitor the acoustic environment and management actions to mitigate adverse impacts from human-caused noise on the park acoustic environment and soundscape and visitor experience. The incremental effect of Alternative B on the effects of past, present and reasonably foreseeable future actions would be long-term, moderate and beneficial.

PARK OPERATIONS

For the purposes of this analysis, park operations refers efforts of park staff and volunteers to maintain and administer park resources and provide for an appropriate visitor experience. This includes an analysis of the projected need for staff time and materials in relationship to acoustic environment and soundscape management under each of the alternatives. The analysis also considers trade-offs for staff time or the budgetary needs required to accomplish the implementation of the alternatives.

Thresholds for identifying impacts to the park operations are defined as follows:

Table 20: Park Operations, Impact Intensity

Park Operations	
Impact Intensity	Intensity Definition
Negligible	Park operations would not be affected or change in operations would not be measurable or perceptible.
Minor	The change in operations is slight and localized with few measurable consequences.
Moderate	Readily apparent changes to park operations with measurable consequences.
Major	The change is severely adverse or exceptionally beneficial in park operations.
Duration	Short-term – The impact would generally last the life of the project or activity or up to one year.
	Long-term – The impact would last longer than one year.

Impacts of Alternative A – No Action
Under the no-action alternative the NPS would continue current approaches to park operations. Park staff would continue to use existing motorized equipment and power tools such as snow plows, backhoes, chainsaws, gas-powered lawn mowers, leaf blowers, and gas-powered weed whips. The number of staff required to complete park maintenance tasks, park fire, and resource management tasks would not change. There would be no change in the amount of time necessary to complete park operations. As a result, Alternative A would have a negligible impact on park operations.

Impacts of Alternative B – Preferred Alternative
In order to meet the acoustic environment objectives outlined in Alternative B, the park would implement management actions that could affect park operations. These measures include minimizing the use of leaf blowers, chainsaws, and other mechanical equipment; considering other products that accomplish the same task (handheld non-power tools, brooms, rakes, electric powered mowers or trimmers, etc.); and considering quiet technology when replacing equipment. Implementing Alternative B could increase demands on staff in the short-term while performing park operations. Park operations in the Historic/Commemorative and Development zones may require changes in the equipment used and/or the time of day that operations could occur. In order to achieve proposed acoustical standards, crews may

need to consider acoustic impacts in selecting equipment used for trail maintenance and other park operations and activities. Initially, it may take park staff longer to complete tasks using quieter equipment. As quiet technology equipment is acquired and staff become more proficient with the use of this equipment, demands on staff time would diminish.

Park staff would collect and analyze acoustic data and implement monitoring protocols to determine levels of compliance with standards. Implementing Alternative B would have beneficial effects on park operations by minimizing staff exposure to noise. Overall, the effects of implementing Alternative B would result in minor short-term adverse impacts to park operations. However benefits to acoustic environment, soundscapes, visitor experience, and wildlife from reduced noise levels would help to offset any adverse impacts to park operations.

Cumulative Impacts
Other past, present and planned future actions have the potential to affect park operations. Impacts to park operations may result from increased visitation. Increased vehicle traffic and visitor presence would potentially increase the demands on park operations. Planned road work could cause short-term adverse impacts to park operations as park staff and resources are diverted to the projects. Park staffing levels may not be appropriate to cover increasing demands from these activities. The minor short-term adverse impacts associated with the implementation of Alternative B would add slightly to the potential adverse impacts from actions described above. As a result, cumulative effects from implementation of Alternative B would result in short-term, minor, adverse impacts to park operations. However benefits to acoustic environment, soundscapes, visitor experience, wildlife, and park employees from reduced noise levels would help to offset any adverse impacts to park operations.

Conclusion
Alternative A would result in negligible impacts to park operations. Overall, the effects of implementing Alternative B would result in minor short-term adverse impacts to park operations however benefits to acoustic environment, soundscapes, visitor experience, and wildlife from reduced noise levels would help to offset any adverse impacts to park operations. The incremental effect of Alternative B on the effects of past, present and reasonably foreseeable future actions would be short-term, minor and adverse.

WILDLIFE, THREATENED AND ENDANGERED ANIMAL SPECIES AND ANIMAL SPECIES OF CONCERN

Recent studies have indicated that wildlife can be adversely affected by noise (Barber, Fristrup, Crooks, 2010). Research has documented substantial changes in foraging and anti-predator behavior, reproductive success, density and community structure in response to noise. This section addresses the effects on wildlife from actions proposed in this EA.

Thresholds for identifying impacts to wildlife are defined as follows:

Table 21: Wildlife, Threatened and Endangered Animal Species and Animal Species of Concern, Impact Intensity

Wildlife, Threatened and Endangered Animal Species and Animal Species of Concern	
Impact Intensity	Intensity Definition
Negligible	No animal species including federally listed species or sensitive species would be affected, or the alternative would affect individual animals, critical habitat, or sensitive species, but the change would be so small that it would not be of any measurable or perceptible consequence to the protected individual or its population.
Minor	The alternative would affect individual animals, listed species, critical habitat, or sensitive species, but the change would be small.
Moderate	Individual animals, populations of animals, listed species, critical habitat, or sensitive species would be noticeably affected. The effect would have some consequence to the individual, population, or habitat.
Major	Individual animals, populations of animals, listed species, critical habitat, or sensitive species would be noticeably affected with a vital consequence to the individual, population, or habitat.
Duration	Short-term – The impact would generally last the life of the project or activity or up to one year.
	Long-term – The impact would last longer than one year.

Impacts of Alternative A – No Action
Under the no-action alternative the NPS would continue current approaches to protecting the acoustic environment. Acoustic objectives and standards would not be developed and an acoustic monitoring program would not be implemented. Wildlife would be exposed to increasing levels of human-caused noise, which could interfere with the natural sounds they need for communication, predator prey relationships, mate selection, territory establishment and other functions.

In most areas, the amount of time that human-caused sound could be heard would increase due to increased noise levels in the park. Maximum and median noise free intervals would decrease. Increases in audible human-caused noise have been shown to decrease the density and diversity of some bird species (Frances, 2009; Bayne et al., 2008) and have been associated with decreased use or abandonment of affected habitats (Doherty et al., 2008; Sawyer et al., 2006).

Reductions in noise free intervals could limit noise free recovery time for sensitive species. Deviation from natural ambient would likely increase over time leading to a decrease in listening area and alerting distance. A decrease in listening area could affect the predator prey relationship making it more difficult for some predator species to locate prey using auditory cues. Decreases in alerting distance could make it more difficult for prey species to elude predators.

Although few studies address sleep disturbance in animals, decreases in noise levels could reduce sleep interruptions on wildlife. Overall, changes in acoustic conditions would move the acoustic resource away from the desired condition leading to long-term, moderate adverse impacts to wildlife.

Impacts of Alternative B – Preferred Alternative
Under the Alternative B the NPS would develop acoustic objectives and standards and implement measures to monitor and protect acoustic conditions. As Alternative B is implemented, wildlife would be

exposed to reduced levels of noise and have greater opportunities to experience important sounds related to communication, predator prey relationships, mate selection, territory establishment and other functions.

In most areas, the amount of time that human-caused sound would be audible to wildlife would be reduced. Maximum and median noise free intervals would increase. Reductions in audible human-caused noise could lead to an increase in the density and diversity of some bird species (Frances, 2009; Bayne et al., 2008) and more efficient and productive use of important habitats (Doherty et al., 2008; Sawyer et al., 2006). Studies also indicate that songbirds shift their calls to higher frequencies in response to ambient noise levels. Reducing noise levels and audibility mitigate that effect. Increases in noise free intervals would increase noise free recovery time for sensitive species. Deviation from natural ambient would decrease, leading to an increase in listening area and alerting distance. An increase in listening area could affect the predator prey relationship making easier for some predator species to locate prey using auditory cues. Increases in alerting distance could make it easier for prey species to elude predators.

Although few studies address sleep disturbance in animals, decreases in noise levels could reduce sleep interruptions on wildlife. Overall, changes in acoustic conditions would move the acoustic resource toward the desired condition leading to long-term, moderate beneficial impacts to wildlife.

Cumulative Impacts
Other past, present and planned future actions have the potential to adversely affect wildlife. Adverse impacts to wildlife may result from increases in vehicle traffic and increased visitor use. Several important wildlife species have been shown to avoid habitat near roadways and areas with high levels of human activity. Increased vehicle traffic and visitor presence would also increase the ambient sound environment. Planned road work could cause short-term adverse impacts to wildlife from noise generated by construction equipment. Resource management activities could cause short-term adverse impacts through the increased use of power tools and other equipment. These changes in addition to development on private lands bordering the park could permanently change acoustic conditions in the park and create minor to moderate, long-term adverse impacts.

The moderate long-term beneficial impacts associated with the implementation of Alternative B would reduce the potential adverse impacts from actions described above. As a result, cumulative effects from implementation of Alternative B would result in long-term, moderate, and beneficial cumulative impacts to wildlife resources.

Conclusion
Alternative A would result in long-term moderate adverse impacts to wildlife because the park would not have the means to address noise issues in a comprehensive and systematic manner. Alternative B would have long-term moderate beneficial effects to the wildlife. The incremental effect of Alternative B on the effects of past, present and reasonably foreseeable future actions would long-term, moderate and beneficial.

CULTURAL LANDSCAPE

The essential elements of the historic landscape create a “sense of place” that is essential to the experience of the park and an understanding of its significance. Culturally and historically appropriate sounds that contribute to the historic sense of place include 1) marching, music, calls, and gunfire from battle reenactments, 2) human activity like walking and interpretive programs along the Battle Road Trail, 3) farm animal calls and agricultural equipment from the farmland, 4) creaking and a quiet atmosphere at historic building sites, 5) natural sounds such as wind, rain, running water, leaves rustling, and animal calls. Noises from these sources can interfere with culturally and historically appropriate sounds that help shape the cultural landscape.

Thresholds for identifying impacts to cultural landscape are defined as follows:

Table 22: Cultural Landscape, Impact Intensity

Cultural Landscape	
Impact Intensity	Intensity Definition
Negligible	Impacts would be at the lowest levels of detection barely perceptible and measurable. For purposes of Section 106, the determination of effect would be no adverse effect.
Minor	Impacts would affect character defining features but would not diminish the overall integrity of the landscape. For purposes of Section 106, the determination of effect would be no adverse effect.
Moderate	Impacts would alter a character-defining feature(s), diminishing the overall integrity of the landscape to the extent that its National Register eligibility could be jeopardized. For purposes of Section 106, the determination of effect would be adverse effect.
Major	Impacts would alter character-defining features or patterns, diminishing the integrity of the landscape to the extent that it would no longer be eligible to be listed on the National Register. For purposes of Section 106, the determination of effect would be adverse effect.
Duration	Short-term – The impact would generally last the life of the project or activity or up to one year.
	Long-term – The impact would last longer than one year.

Impacts of Alternative A – No Action
Under the no-action alternative the NPS would continue current approaches to protecting the acoustic environment. Acoustic objectives and standards would not be developed and an acoustic monitoring program would not be implemented.

In most areas, the amount of time that modern, human-caused sound could be heard would increase due to increased noise levels in the park. Increased noise levels would result from continues development, increases in visitors, use of mechanized equipment, and changes in adjacent land use. Maximum and median noise free intervals would decrease. Increases in audible human-caused noise would reduce the ability to hear culturally and historically appropriate sounds and interpretive programs. Noise could also interrupt battle reenactments and historically-based activities that help create the cultural landscape. Overall, changes in acoustic conditions would lead to long-term, moderate adverse impacts to the cultural landscape.

Impacts of Alternative B – Preferred Alternative
Implementation of Alternative B would help the park meet acoustic resource objectives which are designed in part to protect the soundscape and acoustic environment. This protection would reduce the level and frequency of noise and increase the opportunity to hear culturally and historically appropriate sounds. The decreased levels and frequency of noise contributes to a preserved cultural landscape and compliments other park activities to restore the cultural landscape. The standards identified in Alternative B provide management actions needed to ensure that acoustic conditions are consistent with resource protection and management goals.

In the NHP, the amount of time that noise could be heard would decrease due to a reduction in noise levels in the park. Maximum and median noise free intervals would increase. As a result, occurrence of culturally and historically appropriate sounds that contribute to the sense of place will increase.

Because there is variation in natural ambient levels and acoustic conditions throughout the park, the intensity of the beneficial impacts would vary. In areas where existing noise levels are higher the effect would be greater. In areas with lower ambient levels and fewer noise events, the intensity of beneficial impacts would be less. Overall, changes in acoustic conditions would move the resource toward a desired condition and help achieve acoustic objectives leading to long-term, moderate beneficial impacts to the cultural landscape.

Cumulative Impacts
Other past, present and planned future actions have the potential to affect the cultural landscape of the NHP. Adverse impacts may result from increased visitation (increased vehicles), park operations, and neighboring land uses. Noises from these sources can interfere with culturally and historically appropriate sounds that help shape the cultural landscape. Increased vehicle traffic and visitor presence would potentially increase the ambient sound environment. Planned road work could cause short-term adverse impacts to cultural landscape from noise generated by construction equipment. Resource management activities could cause short-term adverse impacts through the increased use of power tools. These actions are likely to create short-term, minor to moderate adverse impacts on the acoustic environment of the park which would adversely affect cultural landscape. Development on private lands bordering the park could permanently change acoustic conditions in the park and, in turn, create minor to moderate, long-term adverse impacts to cultural landscape. The moderate long-term beneficial impacts associated with the implementation of Alternative B would reduce the potential adverse impacts from actions described above. As a result, cumulative effects from implementation of Alternative B would be long-term, moderate, and beneficial impacts to cultural landscape.

Conclusion
Alternative A would result in long-term moderate adverse impacts to cultural landscape because noise levels in the park could increase over time and the park would not have the means to address noise issues in a comprehensive and systematic manner. Alternative B would have long-term moderate beneficial effects to cultural landscape. Alternative B also identifies a mechanism to monitor the acoustic environment and management actions to mitigate adverse impacts from human-caused noise on the park acoustic environment, cultural landscape and sense of place. The incremental effect of Alternative B on the effects of past, present and reasonably foreseeable future actions would be long-term, moderate and beneficial.

HISTORIC STRUCTURES

Minute Man NHP contains 43 historic buildings listed on the National Register. Actions in this plan may affect equipment on or around historic structures and could have a potential effect on the feeling, setting, and association of the historic designation. Reduction of noise and actions from noise management would have beneficial effects to the overall feeling, setting and association of the structures by reducing the amount and levels of modern, man-made sounds. Some noise reduction efforts from the plan such as installation of mufflers or noise barriers, installation of modern, quieter machinery (i.e. HVAC) could negatively affect historic structures. While use of noise mitigating devices such as mufflers or acoustic barriers could protect some aspects of the acoustic environment, soundscape, wildlife, visitor experience or cultural landscape, they could also affect historic structures. All actions will be in accordance with section 106 of the National Historic Preservation Act (NHPA) and will prevent adverse effects to historic structures. Because there will be beneficial affects to setting and association and any potential effects will be mitigated in accordance with NHPA there will be beneficial effects on historic structures.

Thresholds for identifying impacts to historic structures are defined as follows:

Table 23: Historic Structures, Impact Intensity

Historic Structures	
Impact Intensity	Intensity Definition
Negligible	Impacts would be at the lowest levels of detection barely perceptible and measurable. For purposes of Section 106, the determination of effect would be no adverse effect.
Minor	Impacts would affect character defining features but would not diminish the overall integrity of the structure. For purposes of Section 106, the determination of effect would be no adverse effect.
Moderate	Impacts would alter a character-defining feature(s), diminishing the overall integrity of the structure to the extent that its National Register eligibility could be jeopardized. For purposes of Section 106, the determination of effect would be adverse effect.
Major	Impacts would alter character-defining features, diminishing the integrity of the structure to the extent that it would no longer be eligible to be listed on the National Register. For purposes of Section 106, the determination of effect would be adverse effect.
Duration	Short-term – The impact would generally last the life of the project or activity or up to one year.
	Long-term – The impact would last longer than one year.

Impacts of Alternative A – No Action
Under the no-action alternative the NPS would continue current approaches to protecting the acoustic environment. Acoustic objectives and standards would not be developed and an acoustic monitoring program would not be implemented.

In most areas, the amount of time that modern, human-caused sound could be heard would increase due to increased noise levels in the park. Increased noise levels would result from continues development, increases in visitors, use of mechanized equipment, and changes in adjacent land use. Maximum and median noise free intervals would decrease. Increases in audible human-caused noise would affect the setting, feeling and association of the historic structures. Overall, changes in acoustic conditions would lead to long-term, moderate adverse impacts to historic structures.

Impacts of Alternative B – Preferred Alternative
Implementation of Alternative B would help the park meet acoustic resource objectives which are designed in part to protect the soundscape and acoustic environment. In the NHP, the amount of time that noise could be heard would decrease due to a reduction in noise levels in the park. Maximum and median noise free intervals would increase. This protection would reduce the level and frequency of noise and compliment the historic setting and association around historic structure. The decreased levels and frequency of noise compliments other park activities to preserve the feeling and setting at historic structures.

Overall, changes in acoustic conditions would move the resource toward a desired condition and help achieve acoustic objectives leading to long-term, moderate beneficial impacts to the historic structures.

Cumulative Impacts
Other past, present and planned future actions have the potential to affect the historic structures of the NHP. Adverse impacts may result from increased visitation (increased vehicles), park operations, and neighboring land uses. Noises from these sources can interfere with culturally and historically appropriate sounds that support the setting, feeling and association of these historic structures at the NHP. Increased

vehicle traffic and visitor presence would potentially increase the ambient sound environment. Planned road work could cause short-term adverse impacts to cultural landscape from noise generated by construction equipment. Resource management activities could cause short-term adverse impacts through the increased use of power tools. These actions are likely to create short-term, minor to moderate adverse impacts on the acoustic environment of the park which would adversely affect historic structures. Development on private lands bordering the park could permanently change acoustic conditions in the park and, in turn, create minor to moderate, long-term adverse impacts to cultural landscape. The moderate long-term beneficial impacts associated with the implementation of Alternative B would reduce the potential adverse impacts from actions described above. As a result, cumulative effects from implementation of Alternative B would be long-term, moderate, and beneficial impacts to historic structures.

Conclusion
Alternative A would result in long-term moderate adverse impacts to historic structures because noise levels in the park could increase over time and the park would not have the means to address noise issues in a comprehensive and systematic manner. Alternative B would have long-term moderate beneficial effects to historic structures. Alternative B also identifies a mechanism to monitor the acoustic environment and management actions to mitigate adverse impacts from human-caused noise on the park acoustic environment and setting, feeling and association of historic structures. The incremental effect of Alternative B on the effects of past, present and reasonably foreseeable future actions would be long-term, moderate and beneficial.

While use of noise mitigating devices such as mufflers or acoustic barriers could protect some aspects of the acoustic environment, soundscape, wildlife, visitor experience or cultural landscape, they could affect historic structures. All actions in this plan will be in accordance with section 106 of the National Historic Preservation Act (NHPA) and will prevent adverse effects to historic structures. Because there will be beneficial affects to setting and association and any potential effects will be mitigated in accordance with NHPA there will be beneficial effects on historic structures.

UNACCEPTABLE IMPACTS

As described in *Purpose and Need*, the NPS must prevent any activities that would impair park resources and values. The impact threshold at which impairment occurs is not always readily apparent. Therefore, the NPS will apply a standard that offers greater assurance that impairment will not occur. The NPS will do this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still not acceptable within a particular park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resources and values are acceptable. Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. To determine if unacceptable impacts could occur to the resources and values of the parks, the impacts of the proposed actions in this environmental assessment were evaluated based on monitoring information, published research, and professional expertise, and compared to the guidance on unacceptable impacts provided in NPS *Management Policies 2006* §1.4.7.1 that defines unacceptable impacts as impacts that, individually or cumulatively, would:

- Be inconsistent with a park's purposes or values, or
- Impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process, or
- Create an unsafe or unhealthful environment for visitors or employees, or

- Diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values, or
- Unreasonably interfere with:
    - Park programs or activities, or
    - An appropriate use, or
    - The atmosphere of peace and tranquility, or the natural acoustic conditions maintained in natural, historic, or commemorative locations within the park, or
    - NPS concessioner or contractor operations or services.

By preventing unacceptable impacts, park managers also ensure that the proposed use of park resources will not conflict with the conservation of those resources. In this manner, the park managers ensure compliance with the NPS Organic Act's separate mandate to conserve park resources and values. Using the guidance above, the following text analyzes the potential for unacceptable impacts for all alternatives carried forward in this EA.

- Both alternatives are consistent with the park's purposes and values of providing a variety of opportunities and a range of experiences, from solitude to high use, to assist visitors in learning about and enjoying park resources without degrading those resources. Alternative B (Preferred) provides long-term protection of visitor experience by developing acoustic objectives and standards and identifying measures to monitor and protect acoustic conditions.
- Alternative A (No Action) does not fully address the attainment of a park's desired future conditions for acoustic environment/soundscapes and other natural and cultural resources as identified in the park planning and management documents. This is because the alternative does not identify specific acoustic resource objectives and a mechanism for monitoring to determine if the objectives are being met. Alternative B (Preferred) provides long-term protection of natural and cultural resources by developing acoustic objectives and standards and identifying measures to monitor and protect acoustic conditions.
- Neither alternative creates an unsafe of unhealthful environment for visitors or employees. The management actions identified in Alternative B (Preferred) would decrease human-caused noise in the park. This would have a positive benefit for visitors and employees.
- Under both alternatives, visitors would continue to have opportunities to enjoy, learn about, or be inspired by park resources and values. Alternative B (Preferred) would enhance opportunities for visitors to connect with the cultural and historic setting through interpretive talks and evening programs by reducing human-caused noise. Visitors would also have the opportunity to better experience the sounds of nature and contemplate the importance and significance of the opening battle of the American Revolution.
- Neither alternative would unreasonably interfere with park programs or activities or an existing appropriate use. The atmosphere of peace and tranquility, the natural soundscape maintained in natural, historic, and commemorative locations within the park would be greatly improved by the actions identified in Alternative B (Preferred). NPS concessioner or contractor operations would initially experience some inconvenience by actions identified in Alternative B (Preferred) to reduce human-caused noise. Over time as staff would become more accustomed to using quieter technology and practices, which would alleviate the inconvenience to some extent. The inconvenience would not be considered unreasonable.

Overall, the analysis of effects on acoustic environment, soundscape, visitor use and experience, park operations, and wildlife indicated that there are no major adverse effects under either alternative; effects were analyzed as negligible to moderate. Based on this, and the above analysis, there would be no unacceptable impacts from Alternative A (No Action) or Alternative B (Preferred).

IMPAIRMENT

National Park Service's *Management Policies 2006* require analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the national park system, established by the NPS Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values.

However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within park, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. An impact to any park resource or value may, but does not necessarily, constitute impairment, but an impact would be more likely to constitute impairment when there is a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. The NPS's threshold for considering whether there could be impairment is based on whether an action would have major (or significant) effects. This EA identifies less than major effects for all resource topics. Guided by this analysis and the Superintendent's professional judgment, there would be no impairment of park resources and values from implementation of either alternative.

CONSULTATION AND COORDINATION

PUBLIC INVOLVEMENT SUMMARY

Input for this Acoustic Resource Management Plan was integrated with public scoping for the General Management Plan Amendment for the Battle Road Unit. A public workshop was held in February 2007 with over 100 participants. Newsletters and invitations were sent to a large distribution list. Meeting announcements and results were posted on the park website website (www.nps.gov/MIMA) and the NPS Planning, Environment and Public Comment (PEPC) website (planning.nps.gov). A major visitor use survey was conducted at the park in 2007 and the results presented and discussed at a well-attended meeting in June 2008 with participants from the Concord and Lexington chambers of commerce, managers of nearby historic sites, Friends of Minute Man National Park, and park staff. Letters were sent to the Massachusetts State Historic Preservation Officer, U.S. Fish and Wildlife Service, and the Wampanoag Tribe of Gay Head (Aquinnah) Tribal Historic Preservation Officer notifying them of the start of the planning process, and inviting them to participate. Public meetings were held in October 2014 before the finalization and adoption of the plan.

LIST OF PREPARERS

Table 24: List of Preparers

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Soundscape is the component of the acoustic environment that can be perceived and comprehended by the humans. The character and quality of the soundscape influence human perceptions of an area, providing a sense of place that differentiates it from other regions. *Noise* refers to sound which is unwanted, either because of its effects on humans and wildlife, or its interference with the perception or detection of other sounds.

GLOSSARY

Acoustic Zone	Areas with similar vegetation, terrain, animals, and weather likely have similar acoustic characteristics, including sound sources and sound attenuation characteristics. These areas are referred to as "acoustic zones" and may be helpful in describing acoustic conditions in areas with similar characteristics.
Acoustic Environment	The combination of all the acoustic resources within a given area - natural sounds as well as human-caused sounds - together with the physical capacity for transmitting sounds in a given environment.
Acoustic Resources	Physical sound sources, including both natural sounds (wind, water, geophysical, wildlife, vegetation) and cultural and historic sounds (battle reenactments, tribal ceremonies, quiet reverence).
Ambient Sound Conditions	Many different sounds occur in national parks. In some areas, natural sounds predominate, while in others, both natural and non-natural sounds occur. In order to understand and manage acoustic environment, soundscapes, ambient conditions for different soundscapes need to be acoustically described. Definitions of common ambient sound conditions are provided below.
Ambient Sound, Existing	All sounds in a given area (includes all natural and non-natural sounds). The Volpe Center has used the term "Existing" to describe existing ambient sound conditions.
Ambient Sound, Less Source of Interest	All sounds in a given area excluding a specific sound of interest. For example, when assessing the potential impacts of air tour aircraft, the "ambient sound level less source of interest" would be all sources of sound except air tour aircraft.
Ambient Sound, Natural	All natural sounds associated with a given environment, including all sounds of nature and excluding all non-natural sounds. The natural ambient sound of a given environment is comprised of all natural sounds that occur in the absence of mechanical, electrical, and other non-natural sounds. Natural ambient sound is considered synonymous with the term "natural quiet," although "natural ambient sound" is more appropriate because nature is not always quiet.
Ambient Sound, Non-natural	The ambient sound attributable to human activities. The conditions associated with these sounds are usually composed of many human-caused sounds, near and far, which may be heard individually or as a composite. In a national park setting these sounds may be associated with activities that are essential to the park's purpose, they may be a by-product of park management activities, or they may come from outside the park. These sound conditions need to be defined, measured and evaluated in park planning processes to determine whether or not they are consistent with acoustic environment management objectives.
Amplitude	The instantaneous magnitude of an oscillating quantity such as sound pressure. The peak amplitude is the maximum value.
Appropriate Sounds	Natural sounds are appropriate in national parks. Other appropriate sounds, not natural in origin, are those types of sounds which are generated by activities directly related to the purposes of a park, including resource protection, maintenance, and visitor services. Appropriate sounds may also be associated with cultural, religious or historical celebrations or interpretive demonstrations that are intended to convey park purposes or use park resources in accordance with its establishment legislation. Natural sounds are not only appropriate, but are considered part of the park's resource base to be protected and enjoyed by the visiting public.

Appropriate Sound Conditions	The appropriate sound conditions in a given area of a park is a determination by the park superintendent or authorized decision-maker about the level and nature of sound that is consistent with or mandated by NPS Organic Act principles, establishment legislation, or other laws pertinent to the specific purposes and values associated with the park. This determination may take the form of management zone objectives for acoustic environment/soundscape, as well as measurable indicators and standards for sound.
Audibility	The ability of animals with normal hearing, including humans, to hear a given sound. Audibility is affected by the hearing ability of the animal, the masking effects of other sound sources, and by the frequency content and amplitude of the sound.
Change in Exposure	Difference between the average sound level and the natural ambient condition. This metric reports the difference between the 12-hour energy-averaged sound level (L_{Aeq}) and the ambient (L_{50}). This metric does not provide information on event duration or timing, nor does it mean that human caused sounds levels cannot be heard at or below the ambient. It simply means that the sound levels produced by the human sources are above the natural ambient sound level.
Hertz	A measure of frequency, or the number of pressure variations per second. A person with normal hearing can hear between 20 Hz and 20,000 Hz.
Impact	For environmental analysis, an impact is defined as a change in a receptor that is caused by a stimulus, or an action. In accordance with the CEQ regulations (40 CFR Parts 1500-1508), direct and indirect impacts (environmental consequences) are to be described in an environmental document by assessing their type, magnitude, intensity and duration. The significance of an impact is to be determined specifically in view of criteria provided in 40 CFR 1508.27, based on the outcome of these assessments. An assessment will take account of the short or long term nature of the impact, the extent to which it is either beneficial or adverse, whether it is irreversible or irretrievable, and, finally, its geographic and societal extent. Lastly, a resource impact is put in the context of all other past, present or reasonably foreseeable actions which affect the same resource, and its contribution to the total cumulative effect is to be disclosed. Under CEQ regulations, the term "impact" is synonymous with "effect" (40 CFR 1508.8).
dBA	A-weighted decibel. A-Weighted sum of sound energy across the range of human hearing. Humans do not hear well at very low or very high frequencies. Weighting adjusts for this.
Decibel (dB)	A logarithmic measure of acoustic or electrical signals. The formula for computing decibels is: 10(Log 10 (sound level/reference sound level). 0 dBA represents the lowest sound level that can be perceived by a human with healthy hearing. Conversational speech is about 65 dBA.
Extrinsic Sound	Any sound not forming an essential part of the park unit, or a sound originating from outside the park boundary.
Frequency	The number of times per second that the sine wave of sound repeats itself. It can be expressed in cycles per second, or Hertz (Hz). Frequency equals Speed of Sound/ Wavelength.
Human-Caused Sound	Any sound that is attributable to a human source.

Intrinsic Sound	A sound which belongs to a park by its very nature, based on the park unit purposes, values, and establishing legislation. The term "intrinsic sounds" has replaced "natural sounds" in order to incorporate both cultural and historic sounds as part of the acoustic environment of a park.
L_{eq} or Energy Equivalent Sound Level	The level of a constant sound over a specific time period that has the same sound energy as the actual (unsteady) sound over the same period.
Masking	The process by which the threshold of audibility for a sound is raised by the presence of another sound.
Maximum Sound Level	Lmax is the loudest sound level in dBA generated in an area. Change in exposure is calculated from sound pressure data collected at the park.
Natural Soundscape	The natural sound environment consists of sounds associated with wind, water flow, rain, surf, wildlife, thermal activity, lava flows, or other sounds not generated by non-natural means.
Noise	Sound which is unwanted, either because of its effects on humans and wildlife, or its interference with the perception or detection of other sounds.
Noise Free Interval	The period of time between noise events (not silence).
Off-site Listening	The systematic identification of sound sources using digital recordings previously collected in the field.
On-site Listening	The systematic identification of sound sources at a specific monitoring site using a personal digital assistant (PDA). Custom PDA software records begin and end times of audible sound sources. These sessions often last for one hour.
Sound	Sound is a wave motion in air, water, or other media. It is the rapid oscillatory compressional changes in a medium that propagate to distant points. It is characterized by changes in density, pressure, motion, and temperature as well as other physical properties. Not all rapid changes in the medium are sound (wind distortion on a microphone diaphragm). Basic analytical parameters of sound include frequency, amplitude, and duration.
Soundscape	The component of the acoustic environment that can be perceived and comprehended by the humans. The character and quality of the soundscape influence human perceptions of an area, providing a sense of place that differentiates it from other regions.

Sound Conditions	A number of descriptors may be used when describing ambient sound conditions. These include: • Source of sound • Audibility and percent time audible • Number of sound events/time • Sound level of events • Frequency content of events • Duration of events • Median and log mean sound levels • Minimum and maximum sound levels • Calculated L_{eq}, L_{50}, L_{90}, L_x, etc., for different time periods (hour, day, month, or season). Acoustic data from rural or park-like settings are rarely normally distributed (mostly quiet with a few loud events). Therefore, except in certain situations, the most appropriate measure of central tendency is the median rather than the arithmetic mean. If data are normally distributed, then the mean and median will be very close. In some national parks, sound levels can be very low, often lower than some acoustic systems can measure. It such cases, electrical sounds associated with the measurement device can be higher than ambient. Investigations should always report the lowest levels their instruments can measure, and report, when appropriate, that actual sound levels may be lower than the instruments are capable of measuring.
Sound Impacts	With reference to the definition of sound, sound impacts are effects on a receptor caused by the physical attributes of sound emissions. In the context of national parks, human-generated sound represents an impact on the natural soundscape because it causes physical changes in the acoustic environment that can be detected and measured. The fact that an impact can be measured does not equate immediately to whether the impact is adverse, inconsequential, or beneficial, or whether there are adverse secondary impacts on wildlife, cultural values, or visitors. Based on statistically valid characterizations of the natural soundscape and the total ambient acoustic environment, levels of impact and impact significance are policy determinations.
Sound Level	Sound level is usually conveyed by expressing the *weighted* sound pressure level obtained by frequency weighting, generally A- or C-weighted. The weighting used must be clearly stated: For L_{Aeq}, "A" denotes that A-weighting was used, and "eq" indicates that an equivalent level has been calculated. Hence, L_{Aeq} is the A-weighted, energy-equivalent sound level. The most commonly used scale, A-weighting, adjusts the sound levels across the frequency spectrum to those that are audible to humans.
Sound Pressure, Sound Pressure Level	Sound pressure is the instantaneous difference between the actual pressure produced by a sound wave and the average barometric pressure at a given point in space. Sound pressure level is the logarithmic form of sound pressure
Time Audible	The amount of time that a sound source is audible to an animal with normal hearing.

ACRONYMS

Acronym	Full Name
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
dBA	Decibel – A-weighted
DO	Director's Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FICAN	Federal Interagency Committee on Aviation Noise
GMP	General Management Plan
Hz	Hertz
Leq	Equivalent Sound Level
Lmax	Maximum Sound Level
NEPA	National Environmental Policy Act
NFI	Noise Free Interval
NHPA	National Historic Preservation Act
NPS	National Park Service
NSP	Natural Sounds Program
OHV	Off-Highway Vehicle
PDA	Personal Digital Assistant
SHPO	State Historic Preservation Office
ARMP	Acoustic Resource Management Plan
SPL	Sound Pressure Level
TA	Time Audible
USC	United States Code
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
WHO	World Health Organization

APPENDIX 1: LEGAL AUTHORITIES

The management of the national park system is guided by the Constitution, public laws, treaties proclamations, Executive Orders, regulations, and directives of the Secretary of the Interior and the Assistant Secretary for Fish, Wildlife and Parks. The following authorities are invoked as a basis for acoustic environment management.

National Park Service Organic Act (16 USC 1, 2-4)
This act establishes and authorizes the National Park Service (NPS) "to conserve the scenery and the national and historic objects ant the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

National Environmental Policy Act (NEPA) of 1969, as amended
This Act is landmark environmental legislation establishing as a goal for federal decision-making a balance between use and preservation of natural and cultural resources. NEPA requires all federal agencies to: (1) Prepare in-depth studies of the impacts of and alternatives to propose "major federal actions"; (2) use the information contained in such studies in deciding whether to proceed with the actions; and (3) diligently attempt to involve the interested and affected public before any decision affecting the environment is made.

General Authorities Act (1970, 16 USC 1a-1through 1a-8)
The purpose of this act is to include all areas administered by the NPS in one National Park System and to clarify the authorities applicable to the system. The act states areas of the National Park System, "though distinct in character, are united through their inter-related purposes and resources into one national park system as cumulative expressions of a single national heritage; that, individually and collectively, these areas derive increased national dignity and recognition of their superb environmental quality through their inclusion jointly with each other in one national park system preserved and managed for the benefit and inspiration of all people of the United States..."

Airport and Airway Development Act of 1970 (PL 91-258, 84 Stat.226, 49 USC §2208)
Requires airport development projects to provide for the protection and enhancement of the natural resources and environmental quality and limits the secretary of transportation in circumventing this purpose. No airports can be authorized with adverse environmental impacts unless it is determined in writing that no feasible and prudent alternatives exist and steps have been taken to minimize adverse effects. Relationship is identical to §4(f) of Department of Transportation Act. This Act also placed the Federal Aviation Administration (FAA) in charge of a new airport aid program funded by a special aviation trust fund.

Noise Control Act of 1972, as amended (PL 92-574, 42 USC §4901 et seq.)
This Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. To accomplish this, the Act establishes a means for the coordination of Federal research and activities in noise control, authorizes the establishment of Federal noise emissions standards for products distributed in commerce, and provides information to the public respecting the noise emission and noise reduction characteristics of such products (42 USC 4901). The Act authorizes and directs that Federal agencies, to the fullest extent consistent with their authority under Federal laws administered by them, carry out the programs within their control in such a manner as to further the policy declared in 42 U.S.C. 4901. Each department, agency, or instrumentality of the executive, legislative and judicial branches of the Federal Government having jurisdiction over any property or facility or engaged in any activity resulting, or which may result in, the emission of noise shall comply

with Federal, State, interstate, and local requirements respecting control and abatement of environmental noise.

Grand Canyon National Park Enlargement Act (1975, PL 93-620 §8)
Section 8 recognized "natural quiet as a value or resource in its own right to be protected from significant adverse effect." In addition, it specifically addressed the potential for helicopter operations to cause a significant adverse effect on natural quiet and experience of the park.

The Redwood Act (March 27, 1978, PL 95-250, 92 Stat. 163, 16 USC 1a-1)
This Act affirms the basic tenets of the NPS Organic Act and provides additional guidance on national park system management: "the authorization of activities shall be construed and the protection management and administration of these areas shall be conducted in light of the high public value and integrity of the national park system and shall not be exercised in derogation of the values and purposes for which theses various areas have been established…"

The restatement of the principles of park management is intended to serve as the basis for any judicial resolution of competing private and public values and interests in the national park system (Senate Report No. 95-528 on S. 1976 pg.7). The establishment legislation of each park area provides the authority and direction for management of each park area within the national park system. Purposes stated in the parks establishing legislation or proclamation as the resources and values of a park whose conservation is essential to the purposes for which the area was included in the national park system.

National Parks Air Tour Management Act of 2000 (PL 106-181, Title VIII)
This act prohibits a commercial air tour operator from conducting commercial air tour operations over a national park or tribal lands, except in accordance with the act, conditions prescribed for that operator by the FAA Administrator and any commercial air tour management plan for the park or tribal lands. The act sets forth specific requirements with respect to: 1) granting authority to commercial air tour operators to conduct air tour operations over national parks or abutting tribal lands with specified exemptions; and 2) establishment of commercial air tour management plans (ATMPs). The Act requires the FAA, in cooperation with the NPS, to develop an ATMP for each unit of the National Park System to provide acceptable and effective measures to mitigate or prevent the significant adverse impacts, if any, of commercial air tour operations upon natural and cultural resources and visitor experiences.
Executive Orders

Executive Order 11644 Off Road Vehicles on Public Lands, as amended by EO 11989
This Act established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. Each respective agency head shall develop and issue regulations and administrative instructions to provide for administrative designation of the specific areas and trails on public lands on which use of off-road vehicles may be permitted, and areas in which the use of off-road vehicles may not be permitted.

Director's Order-12 - Conservation Planning, Environmental Impact Analysis & Decision-Making
The purpose of this Director's Order (DO) is to provide the policies and procedures by which the National Park Service carries out its responsibilities under NEPA. DO-12 discusses the NPS approach to environmental analysis, public involvement, and resource-based decision making. The following recommendations are incorporated into DO-12:

- Use of interdisciplinary approaches and principles in decision-making;
- Decisions based on technical and scientific information;
- Establishment of benchmarks demonstrating best management processes (such as resource councils and project review teams) in development, analysis, and review of projects;

- Use of alternative dispute resolution and other processes to resolve internal and external disputes;
- Peer review panels to address conflicts among resource specialists regarding validity and interpretation of data and resource information;
- Analysis of impairment to resources as part of the environmental impact analysis process; and
- Post-litigation review and analysis of decision-making for potential improvements to resource-based decisions.

DO-12: Conservation Planning, Environmental Impact Analysis, and Decision-making
The purpose of this Director's Order is to set forth the policy and procedures by which the NPS will comply with NEPA. The CEQ is the "caretaker" of NEPA. The NPS will abide by all CEQ NEPA regulations and any other procedures and requirements imposed by other higher authorities, such as the DOI. This order is not intended, however, to document all those procedures and requirement; for a comprehensive compilation, refer to handbook 12. NPS also administers a broad range of programs that form a vital part of the NPS mission and which may require NEPA compliance, but are not subject to the provisions of the 1916 Organic Act as they are generally unrelated to management of the national park system units. Handbooks applicable to the specific programs should also be consulted for additional guidance.

DO-28 – Cultural Resource Management
The National Park Service, as steward of many of America's most important cultural resources, is charged to preserve them for the enjoyment of present and future generations. Management decisions and activities throughout the National Park System must reflect awareness of the irreplaceable nature of these resources.

DO-47 - Soundscape Preservation and Noise Management
The purpose of the DO is to articulate National Park Service operational policies that will require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. The necessity for the order is based on the recognition that natural sounds are intrinsic to resource conditions in national parks and to their enjoyment by the visiting public. The necessity is further based on the recognition that human caused noise, in terms of type, loudness, frequency, duration, and area extent, can disrupt both natural ecological processes in parks and visitor experiences. It is recognized that certain individual types or sources of noise have impacts, and that human caused sound in general may cumulatively impact park resources or visitor enjoyment.

DO-47 describes the following components of a Acoustic Resource Management Plan: "Superintendents will address the preservation of natural soundscapes and the elimination, mitigation, or minimization of inappropriate noise sources through NPS planning processes (see *NPS Management Policies 2006*) and operations policies. Soundscape preservation and noise management can be addressed in appropriate sections of General Management Plans or through a variety of park implementation plans. If needed to deal with the complexity or urgency of a noise issue, a separate implementation plan will be developed. These park planning efforts will (1) describe the baseline natural ambient sound environment in qualitative and quantitative terms; (2) identify sound sources and sound levels consistent with park legislation and purposes; (3) identify the level, nature and origin of internal and external noise sources; (4) articulate desired future soundscape conditions; and (5) recommend the approaches or actions that will be taken to achieve those conditions or otherwise mitigate noise impacts."

DO-77 - Natural Resource Management
The purpose of this Director's Order is to establish National Park Service (NPS) policies, requirements, and standards for implementing natural resource management. It is separated into four main sections:

- Natural Resources Management (18 different subheadings such as air resources management, and geologic resources management)
- Resources Uses (11 subheading such as administrative uses, backcountry management, special use permits)
- Planning
- Program Administration and Management

NPS DO-77-1: Wetland Protection

The purpose of this Director's Order is to establish National Park Service (NPS) policies, requirements, and standards for implementing Executive Order (E.O.) 11990: "Protection of Wetlands" (42 Fed. Reg. 26961). E.O. 11990 was issued by President Carter in 1977 in order "…to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative."

36 CFR § 2.12 Audio disturbances

The following are prohibited:

(1) Operating motorized equipment or machinery such as an electric generating plant, motor vehicle, motorized toy, or and audio device such as a radio, television set, tape deck or musical instrument in a manner: (i) That exceeds a noise level of 60 decibels measured on the A-weighted scale at 50 feet or, if below that level, nevertheless, (ii) makes noise which is unreasonable, considering the nature and purpose of the actors conduct location time of day or night, purpose for which the area was established, impact on park users, and other factors that should govern the conduct of a reasonably prudent person under the circumstances.
(2) In developed areas, operating a power saw, except pursuant to the terms and conditions of a permit.
(3) In nondeveloped areas, operating any type of portable motor or engine, except pursuant to the terms and conditions of a permit. This paragraph does not apply to vessels in areas where motor boating is allowed.
(4) Operating a public address system, except in connection with a public gathering or special event for which a permit has been issued pursuant to §2.50 or §2.51.

36 CFR § 2.17 Aircraft and air delivery

Under this regulation the following are prohibited:

(1) Operating or using aircraft on lands or waters other than at locations designated pursuant to special regulations.
(2) Where a water surface is designated pursuant to paragraph (a)(1) of this section, operating or using aircraft under power on the water within 500 feet of locations designated as swimming beaches, boat docks, piers, or ramps, except as otherwise designate.
(3) Delivering or retrieving a person or object by parachute, helicopter, or other airborne means, except in emergencies involving public safety or serious property loss, or pursuant to the terms and conditions of a permit.

Management Policy 4.9 Soundscape Management

The primary NPS Management Policy related to soundscapes is Policy 4.9. Soundscape Management which states:

The NPS will preserve, to the greatest extent possible, the natural soundscapes of parks. Natural soundscapes exist in the absence of human- caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in parks, together with the physical capacity for transmitting

natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive, and can be transmitted through air, water, or solid materials.

Some natural sounds in the natural soundscape are also part of the biological or other physical resource components of the park. Examples of such natural sounds include:

- Sounds produced by birds, frogs, or katydids to define territories or aid in attracting mates;
- Sounds produced by bats or porpoises to locate prey or navigate;
- Sounds received by mice or deer to detect and avoid predators or other danger; and
- Sounds produced by physical processes, such as wind in the trees, claps of thunder, or falling water.

The service will restore degraded soundscapes to the natural condition wherever possible, and will protect natural soundscapes from degradation due to noise (undesirable human-caused sound). Using appropriate management planning, superintendents will identify what levels of human- caused sound can be accepted within the management purposes of parks. The frequencies, magnitudes, and durations of human-caused sound considered acceptable will vary throughout the park, being generally greater in developed areas and generally lesser in undeveloped areas. In and adjacent to parks, the Service will monitor human activities that generate noise that adversely affects park soundscapes, including noise caused by mechanical or electronic devices. The Service will take action to prevent or minimize all noise that, through frequency, magnitude, or duration, adversely affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to, or appropriate for, visitor uses at the sites being monitored. (See Use of Motorized Equipment 8.2.3; Overflights and Aviation Uses 8.4)

Management Policy 5.3.1.7 Cultural Soundscape Management

Culturally appropriate sounds are important elements of the national park experience in many parks. The Service will preserve soundscape resources and values of the parks to the greatest extent possible to protect opportunities for appropriate transmission of cultural and historic sounds that are fundamental components of the purposes and values for which the parks were established. Examples of appropriate cultural and historic sounds include native drumming, music (at New Orleans Jazz National Historical Park), and bands, marching, cannon fire, or other military demonstrations at some national battlefield parks. The Service will prevent inappropriate or excessive types and levels of noise from unacceptably impacting the ability of the acoustic environment and soundscape to transmit the cultural and historic resource sounds associated with park purposes.

Management Policy 8.2.3 Use of Motorized Equipment

The variety of motorized equipment—including visitor vehicles, concessioner equipment, and NPS administrative or staff vehicles and equipment—that operates in national parks could adversely impact park resources, including the park's natural soundscape and the flow of natural chemical information and odors that are important to many living organisms. In addition to their natural values, natural sounds (such as waves breaking on the shore, the roar of a river, and the call of a loon), form a valued part of the visitor experience. Conversely, the sounds of motor vehicle traffic, an electric generator, or loud music can greatly diminish the solemnity of a visit to a national memorial, the effectiveness of a park interpretive program, or the ability of a visitor to hear a bird singing its territorial song. Many parks that appear as they did in historical context no longer sound the way they once did.

The Service will strive to preserve or restore the natural quiet and natural sounds associated with the physical and biological resources of parks. To do this, superintendents will carefully evaluate and manage how, when, and where motorized equipment is used by all who operate equipment in the parks, including park staff. Uses and impacts associated with the use of motorized equipment will be addressed in park planning processes. Where such use is necessary and appropriate, the least impacting equipment, vehicles,

and transportation systems should be used, consistent with public and employee safety. The natural ambient sound level—that is, the environment of sound that exists in the absence of human-caused noise—is the baseline condition, and the standard against which current conditions in a soundscape will be measured and evaluated.

Management Policy 8.4 Overflights and Aviation Uses

A variety of aircraft, including military, commercial, general aviation, and aircraft used for NPS administrative purposes, fly in the airspace over national parks. Although there are many legitimate aviation uses, overflights can adversely affect park resources and values and interfere with visitor enjoyment. The Service will take all necessary steps to avoid or mitigate unacceptable impacts from aircraft overflights.

Because the nation's airspace is managed by the FAA, the Service will work constructively and cooperatively with the FAA and national defense and other agencies to ensure that authorized aviation activities affecting units of the national park system occur in a safe manner and do not cause unacceptable impacts on park resources and values and visitor experiences. The Service will build and maintain a cooperative and problem-solving relationship with national defense agencies to address the congressionally mandated mission of each agency and prevent or mitigate unacceptable impacts of military training or operational flights on park resources, values and the visitor experience. Cooperation is essential because the other agencies involved have statutory authorities and responsibilities that must be recognized by the Service.